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Original Articles

The Treatment of Pulmonary Tuberculosis by Artificial Pneumothorax, with Report of Eleven Cases

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The induction of an artificial pneumothorax as a therapeutic measure in the treatment of pulmonary tuberculosis may properly be considered the latest addition to the accepted and established forms of treatment. Although proposed a century ago by James Carson of Liverpool (1821) its practical application was not seriously considered until Forlanini of Italy, in 1906, reported the results of his twenty-five cases treated by this method. Since 1906 then, fifteen years ago, artificial pneumothorax, or a better term is therapeutic pneumothorax, has taken a very definite and very important place in the treatment of this disease. Like all new measures, it had to go through the experimental period—its effectiveness for good or evil had to be carefully studied and measured. The enthusiasts who hailed it as a panacea and a "cure-all" for every type and stage of phthisis had to be stayed by the hands of experience, and the skeptical and pessimistic had to be convinced that the method had virtues and possessed qualities that no other form of treatment had yet presented. To any one who is familiar with the various stages and variable manifestations of phthisis pulmonalis, it is quite apparent why there should have been so much confusion and difference of opinion regarding the proper evaluation of this treatment. Certainly those who advocated its use in all stages of the disease were wrong, and those who held that it was a measure only to be used in the hopelessly advanced cases were equally wrong. The operation is fraught with too many dangers to be used in early and incipient cases, a large majority of which get well with proper sanatorium treatment; and nothing can be expected of it in the cases in which both lungs are already involved in an active, destructive, ulcerative process, and in addition to which other serious complications are present.

But there is a very large proportion of cases that have passed beyond the incipient stage and have not yet developed into the hopeless stage in which this method of treatment will change the entire course of the disease. And there is sufficient data at hand to definitely indicate that a large proportion of these cases which otherwise would have gone on to destruction are saved and brought back to health and usefulness. And here it ought to be emphasized that every case that becomes hopeless was at some time or other, in the course of its progress to hopelessness, a suitable case for this treatment.

The question then naturally arises, what is a suitable case for this treatment? In our opinion a suitable case is one in which an active lesion is present on one side, and

in spite of the best treatment tends to get worse, and the case as a whole assumes an unfavorable course. The case need not be unilateral in the strict anatomic sense. There may be an implantation in the good lung—there may be a quiescent old lesion in the good lung—or there may even be a small, active lesion in the good lung. But the good lung must not be the seat of an active, destructive lesion, and it must not be diseased to such an extent as to make it impossible for it to carry on the work of the two lungs when the bad lung is collapsed. And most important, the pleural sac on the bad side must be free from extensive pleural adhesions; otherwise collapse is not possible.

It goes without saying that the ultimate prognosis in each case depends upon the condition of the good lung, and the presence or absence of other serious complications.

The effects of artificial pneumothorax might, for purposes of convenience, be divided in one's mind into physical and clinical.

When the diseased lung is collapsed, it is put to rest just as a broken bone is put to rest when placed on a splint. The products of inflammation, pus, mucus, detritus, bacteria, etc., are by compression squeezed out of the lung into the bronchi and extruded. The inflamed and ulcerated surfaces are brought together and held there on the same principle as a stitch holds together the raw surfaces of an open wound, with the result that rest, drainage and coaptation of the inflamed parts are accomplished, and these are the prerequisites necessary in the healing of an infected area anywhere in the body.

Immediately this is accomplished the clinical picture changes. The temperature drops to normal within a week or ten days, all the symptoms of toxemia vanish, the cough abates, and in some cases ceases at once; night sweats cease, the appetite improves, the weight, though not increased at first, soon begins to go up; and the patient is transformed with striking rapidity from a febrile, toxic, septic, declining individual, to an afebrile, atoxic, comfortable, convalescent one. The accompanying temperature and weight charts of cases treated at the Eagleville Hospital illustrate these phenomena.

The effects just described are immediate

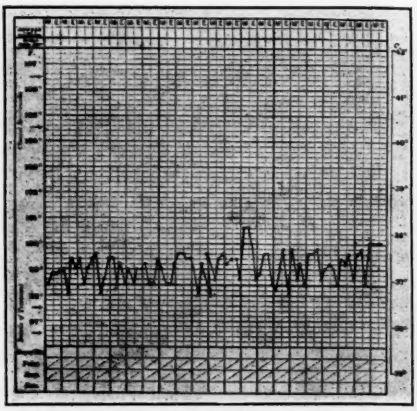

FIG. 1a.—Chart showing temperature curve for the six weeks immediately preceding the induction of artificial pneumothorax.

and occur with fair regularity. The ultimate results are, of course, modified by many and varied conditions, and are not as gratifying and as marvelous as the

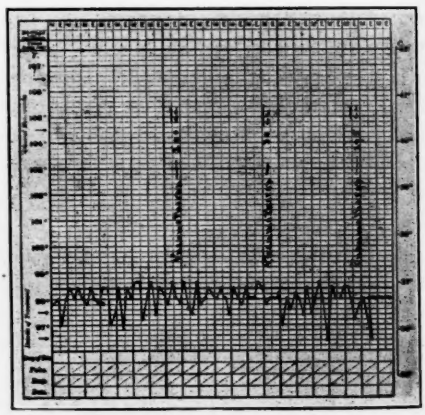

FIG. 1b.—Temperature chart of same case three months after induction of artificial pneumothorax. Chart represents temperature curve for six weeks.

immediate ones. But leaving the discussion of the ultimate effects for later on, for the moment we must emphasize the fact that there is no known therapeutic agent that will produce the immediate results described with such promptness and regularity in

cases of advanced, active, progressive pulmonary tuberculosis. The ultimate results are attained only after a long and painstaking course of treatment. The lung must be kept in a collapsed state for two years at least in the moderately advanced cases, and as long as four years in the far advanced types. This is accomplished by refilling the chest with gas from time to time, depending upon the symptoms; but it is not necessary that the patient should be an invalid during this period. Many cases employ themselves usefully and profitably while undergoing this treatment. It is best, however, to go slowly. We like to keep our patients at the sanatorium at least a year, under the strictest discipline, and only very

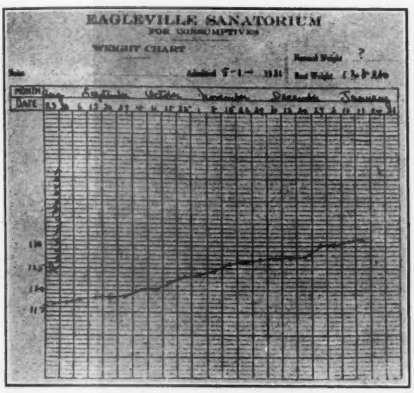

FIG. 1c.—Weight chart of same case while undergoing pneumothorax treatment. Chart represents period of five months.

gradually and very slowly increase their daily exercise. On the other hand, we have patients who left the hospital within six months of their admission who are at home attending to their affairs, and come for refills every three or four weeks.

For the purpose of this paper I wish to present our experiences with eleven patients treated by this method in the Eagleville Hospital at the Henry Phipps Institute. These cases were selected out of 171 admissions, covering a period of thirteen months beginning November 27, 1920. The number selected comprises 6.4 per cent of all the cases admitted to the hospital in that period, and it shows how few of the advanced cases are suitable for this form of treatment. Of course, the purpose of the Eagleville Hospital is primarily to care for and treat advanced consumptives. Most of the cases admitted here are practically in a dying state. All have run the gamut

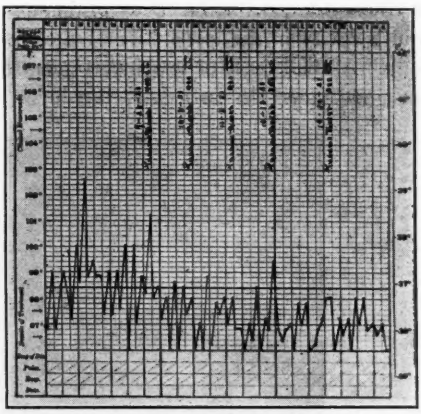

FIG. 2a.—Chart showing temperature curve for two weeks immediately preceding induction of artificial pneumothorax and for four weeks after treatment was instituted.

through the various stages of tuberculosis, and all present more or less serious complications. It is not surprising then that only 6.4 per cent of the total admissions were available for this treatment. It is not possible to say what proportion of the 93

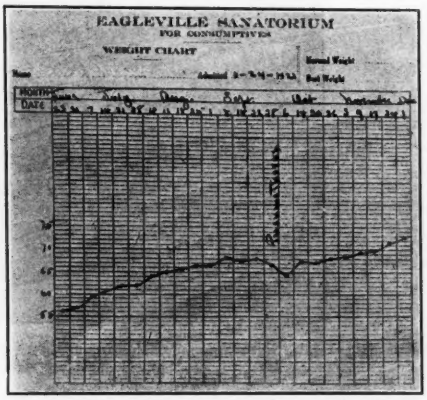

FIG. 2b.—Weight chart of same child. Case is that of a girl 12 years old. Child is now free from symptoms and on exercise.

per cent would have been suitable cases for this treatment at some time or other in the course of their disease, but it is fairly reasonable to assume that most of them would have benefited had they received this treatment at the appropriate moment.

Among these eleven cases there were eight women and three men. One had been sick since 1913, three since 1916, three since 1918, and four since 1919. All but one were stage three or four cases. All had cavities. One girl had a cavity in the upper and a cavity in the lower lobe of the right lung. All had more or less involvement on the good side. In two cases the involvement in the good lung was quite active, but breaking down had not yet occurred. One case was acute, with breaking down, with softening and cavity formation, hemorrhages, high temperature, and marked toxemia. One in addition to his active tuberculous process, involving the lower half of the right lung, had a four plus Wassermann. And, as I have said before, all were unsuitable cases for sanatorium treatment. The results in these eleven cases were as follows:

Two have since been transferred to the Eagleville Sanatorium. They are receiving their pneumothorax treatment there; they are free from toxemia, are up and about, and are doing as well as any of the incipient cases out there.

Fig. 3.—Skiagram of right lung incompletely collapsed. Pleural adhesions preventing collapse at apex and at base. This case had an old cavity at apex and an active lesion at base.

Four are still in the hospital. Two are free from fever, are free from toxemia, are gaining weight, and slowly improving.

Of the other two, one is a man who had a four plus Wassermann in addition to his very active tuberculous process, and in his case the treatment was abandoned because of a pneumonitis developing on the opposite side.

The other, a young girl running a very active course, developed acute manifestations on the opposite side, and after four injections of gas the treatment was stopped.

Two cases left the hospital and are at home looking after their affairs. One is engaged in the laudable occupation of shattering the Volstead Act. He drives down in his own car from Logan, gets his fill of gas, and returns to his nefarious occupation. The other is looking after his little grocery store. Both of these cases come to the hospital about every three weeks for refills.

Three cases died. One was a young girl who had been ill since 1913, with cavity formation on the bad side, and a mild active lesion involving the upper lobe on the good side. Soon after the bad lung was collapsed she developed marked activity on the opposite side. Treatments were discontinued and she died within a month.

The second case was a young woman who had been ill since 1918, with marked involvement and cavity formation on the bad side, and what seemed to be an inactive lesion on the good side. She was running a very high and septic temperature, with oscillations varying from 102° to 97°. After having watched her for several months we decided to try pneumothorax. We were able to effectively collapse the bad lung, but it made no impression upon the temperature, and after the fourth injection we decided to discontinue the treatment because of the activity on the opposite side. This woman died three months later.

FIG. 4.—Skiagram of right lung completely collapsed. Note "sausage shape" of lung—displacement of mediastinal contents to left and depression of diaphragm.

The third case was an Italian woman,

thirty-five years of age, who was admitted to the hospital on February 28, 1920. She gave a history of having been ill since 1916. Her sputum was four plus, and she was running a very high temperature. She had frequent hemoptysis and was very miserable. Upon examination we found a large cavity in the left upper lobe, with extensive infiltration and breaking down in the rest of the lung on that side. She had an inactive lesion involving the right upper lobe. We successfully collapsed the bad lung. She responded beautifully. Her temperature dropped, her weight increased from a half to a pound a week for two months, the bleeding stopped, she felt better in every way, and we were all very much encouraged. At the ninth injection she suffered a severe attack of pleural shock. She became unconscious, developed tonic convulsions, and though we were able to resuscitate her she only survived a week.

I appreciate the fact that these cases are too few in number and that sufficient time has not yet elapsed upon which to base any authoritative conclusions. But the striking feature in the analysis of these eleven cases is that 55 per cent are doing well, whereas practically 80 per cent of the 171 from which these cases were selected have since died. Whatever the future of these six cases may be, their present status is certainly a much happier and pleasanter one than is that of the cases that were found unsuitable for this treatment.

In the last analysis it is the ultimate results in any method of treatment which establish its value. It is very gratifying and very pleasant to have at one's command a method of treatment which will result in immediate improvement, which will minimize suffering, and which will prolong life and enhance comfort. But its real value depends upon the ultimate results. A study of the statistics available from different parts of the world as to the ultimate results in the treatment of pulmonary tuberculosis by this method is somewhat confusing and bewildering. But this is due to the fact that different authorities are working with different stage cases under different conditions, and there does not yet seem to have appeared a standard by which results may be evenly measured. The consensus of opinion seems to be, both here and abroad, that 50 per cent of the cases treated by artificial pneumothorax show positive improvement; that about from 23 per cent (American statistics) to 35 per cent (European statistics) of the cases go on to ultimate arrest, quiescence, or cure. Most of the failures recorded are due to the fact that complete collapse of the diseased lung is not possible as a result of extensive pleural adhesions. Saugman claims that in the cases presenting adhesions only in 10 per cent can there be any hope for success, while in well selected cases with free pleura, 50 per cent recover completely. Jacobean recently devised a method of severing the pleural adhesions with an electric thermocautery, through an instrument which he devised and which he calls a thoracoscope. This instrument works on the same principle as a cystoscope.

In view of the fact that we are dealing with advanced cases of pulmonary tuberculosis, cases in which sanatorium care proved ineffectual, cases that would otherwise terminate fatally, I think the results quoted are very gratifying.

Before concluding it is necessary to call attention to the fact that certain dangers and complications occur during the course of this treatment, and these may be divided into immediate and remote. The immediate dangers are pleural shock and air embolism, each capable of producing sudden death. Saugman reports 210 cases treated over a period of eight years, entailing 5400 operations, with two deaths. Sacks reports 26 cases of pleural shock, none of them fatal, among 1058 pneumothorax cases gathered from American literature. I have encountered pleural shock twice in upwards of 1000 operations, with one death. It is the opinion of most operators that with careful technique these accidents can be greatly minimized.

The later complications are pleural effusion and empyema. The former, not necessarily serious, occurs in about 50 per

cent of the cases treated. In my own experience, covering a period of ten years, it has occurred in about 10 per cent of the cases. In the cases reported here there has been no pleural effusion, though they have been subjected within the last two weeks to roentgenologic and fluoroscopic study. Empyema is, of course, the most serious complication and is usually fatal. This unfortunate condition is always the result of infection. The infection may be carried in from without by the operator, or may result from a rupture of a diseased portion of the lung infecting the pleura from within. Fortunately this complication does not appear to be a very frequent one. I encountered it once in over a hundred cases that I have treated, necessitating a thousand operations. There are reports here and there of an occasional cure even after this complication arises, but personally I have never seen a case of tubercular empyema that ever got well.

In conclusion I wish to emphasize several facts which, to my mind, deserve our serious consideration:

First, we are dealing here with a form of treatment which is designed to help the advanced cases of pulmonary tuberculosis, cases which heretofore had been considered hopeless.

Second, the success of the treatment depends largely upon the selection of the proper type of case.

Third, there is a certain period in the life of most consumptives when this treatment is appropriate.

Fourth, once the case assumes an unfavorable course, the sooner the operation is done the greater the chance for ultimate success.

Fifth, from present indications the profession is not availing itself of the use of this form of treatment.

Sixth, the operation is fraught with certain dangers, but these can be greatly reduced by careful technique.

Seventh, it takes at least two years to attain results in moderately advanced cases, and at least four years in cases of the markedly advanced type.

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Prostatism Relievable by Remedial Movements

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Prostatism, the characteristic misery of masculine middle and late age, is in my opinion a condition susceptible of prevention, and, in my experience, of control when acquired, provided it be not too far advanced or complicated. In short oftentimes there may be obtained a clinical cure.

Prevention of prostatism is deserving of vastly more attention than is appreciated, especially if measures are omitted until the evil days come when malignant disease supervenes. Then only a serious operation can give relief. The topic has occupied much of my attention, having afforded help to many friends and patients by the means recommended now and formerly.

Let us get a fair idea of the conditions present, the means of prevention, and the remedial procedures that can be confidently recommended.

Prostatic enlargement is not merely a form of senile hypertrophy. In a few instances (5 per cent) it has been found due to spinal cord changes. In another 5 per cent it is due to stenosis of the urethra, to diverticulum or disease of the bladder. In practically all the other cases the disturbance results from a neoplasm of the prostate, which atrophies and becomes squeezed into a thin shell by a growing adenoma, the removal of which restores the parts substantially to normal. (See V. Blum, Med.

Klinic, Berlin, July 24, 1921; Abstract *J.A.M.A.*, Oct. 8, 1921.)

The age when prostatism occurs is also that of tumor formation. In every phase of prostatic adenia hemorrhage may occur, from which many die. Also grave perils of infection then hang over the sufferer incessantly. A considerable proportion of cases eventually (14 per cent) prove to be cancerous.

So much for the situation of a man who begins to be distressed from impulse to nightly micturition, whether this is occasional, constant, moderate, or imperative and excessive, with or without pain or increasing tenesmus.

What do all these warnings signify, and what is demanded? Plainly that the circulation in the prostatic structures, or adjacent thereto, is passively congested and the parts need to be suitably and adequately moved, exercised, and alternately stretched in consonance with design, in order to maintain the ebb and flow of nutrient fluids and to secure release of compressions exerted on tubes, vessels, the carriers of fluids, and of nerve currents, for thereby uniform drainage, oxidation, and oxygenation is expedited.

Let me reiterate certain points from a former paper *(American Journal of Urology,* October, 1915):

The problem of prostatism seems to be, among others, to rid the organ of the vitiated blood and lymph stagnated in and about a region peculiarly sensitive to the effects of toxic waste products.

Most observers admit that with the exception of expert massage, little of hope remains short of catheter relief and radical operation.

Results from cures referred to urologists leave much to be desired, so I conceived it to be my duty to find a means of checking the progress of the milder conditions, and success was greater than expectation, even in some well-advanced cases.

One of my particular studies has always been that of the efficacy of performance of normal movements as a remedy for stagnation (kinesiology), which I am persuaded is a branch of medicine in itself capable of affording valuable contributions to therapeutics.

A scientific study of movements, active and passive, applied to the regulation of function and also to the repair of the effects of disease will well repay any one.

As an illustrative instance of this I will cite my experience in some seventy-five or one hundred instances of well-marked, and a few seriously disabled, cases of prostatism. Being well aware of the incredulity with which my statements are likely to be received, let me urge that some of my cases were among well-known physicians, their own persons being grievously tormented by loss of bladder competence. They can and perhaps would testify to the facts.

Briefly my postulate is: Aging structures are distinguished by rapid increase of connective tissue or density in structures, especially those least used, least subjected to normal actions, leading to maintenance of normal elasticity, mobility, pliancy. This impairment in flexibility leads to stagnation, water-logging, and hypostasis in delicate structures.

Now whereas such hypoplastic phenomena can be ordinarily endured, neglected, or even remain unrecognized, provided the structures direct or associated involved are able to become fairly compensated, in respect to the prostate this is followed by distress and disability, unrelievable except by some mechanical device, humiliating and dangerous, such as the catheter.

Clearly the desideratum is to draw away the stagnated fluids which by their continued presence bring about hypoplastic changes, among which is shutting off the overflow of urine.

Entering upon this quest I tried out various movements, more and more practical, till I devised a method which is the epitome of simplicity and convenience. So readily is it performed that some persistence is required to enforce its continuance.

This is what I have named the "desk exercise." The subject stands first 18, later 24 or 30, inches from the side of a desk (or

object of similar height), places one foot on the edge, and leans forward, letting the shoulder fall inside the knee and close to it; bending forward till the knee is above the shoulder, throwing the upper thigh nearly in a straight line with (but in opposite direction to) the standing thigh. I direct that three forward movements be made, a little further each time, till the last is as far as possible. Then the other foot is placed on the edge of the desk, and three forward, increasingly forceful movements as before. These stretches are repeated four to six times, and two or three times a day. It is well to first stand near the desk and later farther away, 30 or 36 inches, thus to increase the stretch. For those who are both zealous to recover and fairly agile, an excellent improvement on these procedures is to kneel on the floor on all fours, and perform a series of alternately long hops from one leg to another.

Happily the procedure needs no preparation, no equipment, no expert to dog one's steps, no loss of time. At first the structures after stretching become painful, sore, due to unaccustomed action; this soon passes away. Pliancy rapidly increases. Soon the thigh bones can be brought into almost complete reversal, in alignment but in opposite directions.

The structures involved in the stretching process recommended (whereby drainage is exerted on the prostate) are as follows:

The levator ani muscle practically encircles the outlet of the pelvis from the tip of the coccyx behind to the symphysis pubis in front.

It is divided in three portions: the anterior inserted along the sides of the prostate and rectum, the middle in the median raphe, and the posterior in the tip of the coccyx.

On both sides it is covered by fascia. On its inner aspect is the rectovesical fascia, which divides to encircle the rectum, and is continuous with that of the opposite side.

On its outer aspect is the anal fascia, which at its upper extremity is blended with the obturator fascia.

This fascia follows down the side of the pelvic wall, turns outward, and blends with the superficial fascia of the gluteal region.

By abducting the femur of each side alternately, the integument of the gluteal region is put upon the stretch near the anus, and thus the fascia that is in relation internally with the levator ani pulls outward on this muscle and acts on the prostate and rectum to which it is attached.

CONCLUSIONS.

1. Prostatism, certainly in its earlier and sometimes in later and serious stages, can be materially relieved by systematic stretching of the tissues in and about the tuberosities of the ischia, prostatic plexus, etc.

2. The effects produced are drainage of vitiated lymph by increasing the elasticity of the structures near the prostate.

3. This stretching can be effected passively by a skilled masseur, or better by the physician himself, the patient lying prone; or by the patient, who can himself perform simple movements, his feet alternately resting on an object about as high as his pelvis.

4. This rational remedial measure can readily be employed to supplement any other agencies needed.

Suggestions in the Treatment of Cough in Pulmonary Tuberculosis

BY HENRY A. GORMAN, M.D.
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To many the word cough, especially if qualified by the term chronic, and tuberculosis are held in close relation. As a matter of fact, the vast majority of those afflicted with pulmonary tuberculosis will at some time or other during the course of their disease complain more or less of this distressing symptom.

Inasmuch as the etiological factors producing cough in those suffering with pulmonary tuberculosis are many and varied, and can be grossly classified as either pulmonary or extra-pulmonary in origin, it is desirable to first determine the pathological condition producing this symptom.

Our physiology tells us that cough is a reflex produced by stimulation of the fibers of the pneumogastric. It is thus seen that the origin of the reflex known as cough is quite apt to be extra-pulmonary, and in this manner we can account for the so-called stomach cough, cigarette cough, and the occasional reflex from the auditory canal.

As a matter of experience, the cough which has been the most violent and persistent and demanded the most vigorous treatment in our cases of tuberculosis has been dependent largely on associated conditions, such as bronchiectasis, emphysema with chronic bronchitis, and the pneumokonioses—frequent complications. One of our best authorities is responsible for the statement that it is possible for a case of pulmonary tuberculosis to develop to an advanced condition, in fact to reach the stage of cavitation, without appreciable cough or expectoration. These cases are no doubt extremely rare, I admit, but nevertheless serve to illustrate that tuberculosis *per se* is not necessarily a continuous paroxysm of coughing.

Again, in a chronic toxemia such as tuberculosis produces it is not to be wondered that intercurrent conditions frequently arise on account of the impoverished condition and lowered resistance of the entire organism which are manifested by changes in the heart, kidney, and blood. For these reasons a thorough search for extra-pulmonary conditions capable of producing cough should be made before attempting treatment. If irritation is found in the auditory canal, usually impacted cerumen, local attention is given, as also in the case of various conditions found in the nose, pharynx, and larynx; the latter on account of its frequent coincident tuberculous condition often requires the attention of the specialist. If we feel the cough to be dependent on gastric irritation appropriate treatment should be directed to that organ. Conditions of the heart and vessels capable of producing cough should be sought for, and if found given attention. It is a matter of common observation that wherever an extra-pulmonary condition in a case of pulmonary tuberculosis has been removed corresponding improvement has been noted in the course of the chest disease. I have seen remarkable benefits after removal of tuberculous foci such as testes, bones, etc., complicating tuberculosis of the lungs.

However, we are particularly interested in the cough which we must attribute (by a process of elimination) to the tuberculous process. We can roughly speak of this cough as being of two general types, the productive and non-productive.

Inasmuch as any real pulmonary cough has a fixed purpose, to remove secretions from the air-passages, thereby permitting a more free passage for air and indirectly removing from these passages products whose absorption is deleterious to the organism, measures to inhibit a productive cough are seldom indicated and should be given serious consideration before administration.

Only in cases showing such signs as hemorrhagic tendencies, pleuritic distress, or indications of exhaustion which is apt to

follow long-continued and frequent paroxyms, especially should these persist during the night, interrupting sleep, should we resort to the use of drugs.

Explanation to the reasonable patient often suffices to justify the physician's apparent lack of attempt to cure the cough. At times it is necessary to attempt checking the secretions when very excessive, as when the patient is experiencing difficulty in keeping the passages free. For this purpose the preparations of heroin or codeine with terpin hydrate or creosote are quite efficient.

The handling of the non-productive cough is a different proposition. The patient, as well as the physician, realizes that nothing is accomplished aside from the unpleasant exercise entailed in the act.

It is surprising the control many patients achieve in suppressing the useless cough. Suppression should be taught, and the patient given to understand that nature has provided him or her with an arrangement—the cilia—to keep clear the respiratory tract, and that he need lend but little help, merely sufficient to dislodge secretions from the larynx and its environs. My attention has often been called to the scarcity of the cough in assemblies of several hundred tuberculous patients during a service or entertainment, which can only be explained by voluntary suppression, developed to a high degree. I feel that the magical results, in some cases, of small doses of mist. glycyrrhizæ comp., which has been shown to be therapeutically inert, emphasizes the psychic element of the cough at times prominent.

Rest is usually indicated in cases of persistent cough, and it is gratifying to note what twenty-four or forty-eight hours under covers will often accomplish. This I feel can be accounted for by the fact that not only the entire body but the lung itself is placed in a state of minimal activity, and the inflamed part is favored as well as relieved of the irritation of greater quantities of air coincident with exertion. Again, a fairly constant temperature is established which greatly relieves the vasomotor system and offers it an opportunity to pull itself together and overcome conditions of congestion, etc.

The intestinal tract should be given scrupulous attention, and a laxative is usually in order, which, besides reducing the toxemia, helps in the adjustment of the circulatory embarrassment.

The skin can be deputized, and the hot bath, Turkish baths and mustard footbaths, as well as the local use of mustard, iodine, and camphorated oil, are all valuable assets, active chiefly by virtue of their eliminative and counter-irritant properties.

The irritative cough, dependent on dryness or lack of secretion in the upper respiratory passages, can often be relieved by such measures as the sipping of small quantities of olive oil or swallowing small pieces of vaselin, supplemented by inhalations of a preparation such as

> Menthol, gr. 10;
> Chloroform,
> Alcohol,
> Creosote, ää f3iiss,

a few drops of which are placed in a mask and inhaled for a period of fifteen minutes. This measure is quite valuable where pulmonary hemorrhage threatens.

Inhalations of oil of pine in compound tincture of benzoin are likewise helpful.

Following a suggestion in the literature on the results of acetylsalicylic acid in the treatment of cough in far-advanced pulmonary tuberculosis, I have used this drug in doses of fifteen grains with a glass of hot milk at bedtime, and have had cheerful reports in the morning. The action can possibly be attributed to the antispasmodic and slightly somnifacient effect which aspirin appears to have on some patients. Often the cough is persistent, with the expectoration scant and thick, despite these measures, and it is necessary to resort to an expectorant preparation which will answer two demands: first, to diminish the frequency of the cough, and secondly, to stimulate secretions. The first is accomplished by heroin hydrochloride in doses of 1/12 to 1/8 gr., while the latter demand is

met by ammonium chloride in doses of 10 to 15 grains. The vehicle of this preparation is optional, yet I favor a syrup, as I believe by so doing some local action is derived, and I do not feel that vehicles of such character are responsible for the gastric derangement usually accredited them.

The use of Hoffmann's anodyne has given fairly good results in some cases and is worthy of a trial.

It is not to be forgotten, however, that the foregoing suggestions on the treatment of cough must be reënforced by the usual hygienic and dietetic measures representing the bulwark of our treatment, namely, abundance of clean fresh air (patient properly clothed and avoiding drafts), maximum amount of exposure to sun, and a liberal constructive diet limited only by the individual's ability to assimilate.

Tuberculosis Problems[1]

BY KARL VON RUCK, M.D.
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(Concluded)

In answer to Dr. Hare's questions Nos. 7, 8, and 9 (namely: (7) In what type or types of tuberculosis do you consider the use of tuberculin a useful remedy? (8) If you use it, what kind do you use, and in what beginning dose and how often? (9) Do you use it at all as a diagnostic agent? If so, how?) I can speak with great assurance and with firm scientific support, based upon an experience of thirty years in the study of the subject. The material comprised many thousands of patients and several thousand animals.

Dr. Hare's inquiry concerns the use of tuberculin and the particular preparation of it, as diagnostic and therapeutic agents. Before it may be answered we must first settle what we really mean by "tuberculin," a name which since its introduction in 1891 to the present time has meant to the majority of the profession any and all the substances that are obtainable from the bacillus of tuberculosis, regardless of differences in their action or mode of preparation. They are often and more erroneously still spoken of as a "serum," which some physicians have supposed to be obtained from the blood of tuberculous animals.

The nomenclature has been an unfortunate one from the beginning. The first name given it in 1890 was "lymph," which conveyed no meaning at all, being a condensed water-glycerin extract of tubercle bacilli, previously grown on solid media. When large quantities of tubercle bacilli were required, in the manufacture of lymph, the latter were grown upon liquid media, and when the growth had matured the whole culture, *i. e.*, medium and bacilli, was subjected to boiling heat until condensed to one-tenth its volume. The bacilli were then removed by filtration. The name "tuberculin" was given to this preparation, which contained also the proteids and glycerin of the culture medium, and it is still more correctly spoken of as "old" or "Koch's old tuberculin." At this time the secrecy surrounding the nature of the original lymph and of tuberculin was dropped, and soon thereafter the great expectations previously entertained disappeared, and tuberculin therapy was largely discredited, chiefly by Virchow's opposition.

From that time until 1897 an intensive study was however given the subject; new preparations were brought forward and purified and modified products were introduced, most of them under the name of tuberculin. Students who had become convinced earlier that the original lymph, or

[1]The first part of Dr. von Ruck's article appeared in the THERAPEUTIC GAZETTE for March.

tuberculin, had at least some value, and that its action upon tubercle was strictly specific, were especially concerned in these studies.[1]

The result of my own investigations since I gave in detail in "Studies in Immunization," on page 122 and following. In 1897 Professor Koch brought out a new preparation which he called "Tuberculin R," which in fact was a tubercle bacillus emulsion, and should have been so designated. At the same time I brought out a "watery extract of tubercle bacilli" derived from their body substances, both Professor Koch and myself recognizing them to be necessary, to obtain or to increase the desired bactericidal immunity.

Under the use of this watery extract my own and the clinical results of others who also employed it became much better, and in my opinion better than others obtained from Koch's Tuberculin R, or from his later preparation called "New Tuberculin," which was again an emulsion of tubercle bacilli, only prepared differently. Seeing no advantage, and for other reasons, I was unwilling to use emulsions of tubercle bacilli, living or dead, and I devoted my further investigations to the chemistry of the tubercle bacillus with the object of obtaining all constituent parts in solution. These efforts resulted in 1906 in the isolation of four chemically different proteids and two lipoids.[2]

Further studies of the action of the several proteids and lipoids (which have since been designated by Much as "partial antigens") were then undertaken, and were tried singly and in combinations in animal experiments; the outcome was my "vaccine against tuberculosis," the nature and method of production of which I published in 1912 with the clinical and experimental data then available.[1]

Before and during the time intervening, and up to the present time, all sorts of tuberculins and tubercle bacillus emulsions have been introduced, and most manufacturers of biological products now offer them for sale. Their critical consideration and comparisons would no doubt supply interesting reading, but I have already done this in a previous publication. Here I may repeat that all the preparations available, and regardless of their names, may be divided into two groups: one group containing chiefly the metabolic products or exotoxins, like Koch's original tuberculin; the other group containing tubercle bacilli in emulsion, or all their constituent fractions in solution, which latter is represented by my vaccine.

At the time of Koch's introduction of his tubercle bacillus emulsion in 1897, under the name of "Tuberculin R," biological research had already demonstrated that the metabolic products of bacteria cannot produce immunity against the bacteria themselves, that their administration is followed only by an immunity against them, leaving the microörganisms which produce them uninfluenced. It was also known that the defensive substances which develop in response to either bacterial exo- or endotoxins are strictly specific, that a like response follows the administration of any foreign albumen or proteid and lipoid and certain other organic substances.

For explaining the related phenomena, Ehrlich had introduced his so-called side-chain theory, which postulates a so-called receptor apparatus of certain of the tissue cells, the receptors possessing affinity for the molecules of the foreign organic substance, by which it is anchored to the cell, and is then reduced and digested to correspond to an elementary chemical state that is normal to the nutrition of the particular animal organism.

This means therefore parenteral digestion in place of gastrointestinal digestion, which

[1] I was one of them and sought the aid of Prof. Edwin Klebs, whose work in these efforts carried out in Zürich had attracted my attention. Finding Klebs absolutely prejudiced in favor of his own preparations, and his animal experiments, by which he expected to convince me and others, unreliable, I refused their publication until he should repeat them with necessary controls and with the avoidance of all reasonable objections. This position on my part, together with my clinical results, which showed no material difference from such as had been observed before his preparation was employed by me, led to a separation.

[2] Thereafter a water-soluble but heat-coagulable albumen was found as a part of one of the proteids in extremely small amount. More recently I also separated a colloidal proteid; both cause specific reactions in tuberculous patients and animals.

[1] *Medical Record*, vol. 82, 1912, No. 9, p. 369.

latter likewise prepares and reduces foreign substances which can serve as food to the necessary elementary chemical state, to be utilized by the cells for their nutrition.

Ehrlich's theory also gives the explanation why it is that we cannot successfully administer by the mouth toxins or other organic nitrogenous substances against which we seek to immunize, as their reduction would occur before they reach the receptive cells, which themselves must acquire the necessary digestive function for the foreign substance, and which must therefore reach them unchanged through the blood in order that the function may develop and protect the organism from deleterious consequences from their absorption, or accidental introduction.

In the work on immunization in tuberculosis heretofore referred to I have considered the involved principles at greater length, but if I have been understood in the foregoing concise statements, the reader should appreciate that we can immunize not only with bacterial toxins of the exo or endo types, but also with any other foreign albumen, proteid, or lipoid, whether this is of vegetable or animal origin, providing it is introduced by inhalation, inunction, or by subcutaneous or intravenous injection. The route chosen must protect it against gastro-intestinal digestion. When this condition is complied with and certain cells of the body can bind or anchor them, the cells acquire the necessary digestive function, which is the same or similar as would occur normally in the digestive tract.

Specific resistance or immunity in tuberculosis means therefore a power of the tissue cells to bind, reduce, digest, and destroy tubercle bacillus toxins, or the tubercle bacilli themselves. It may be acquired for one or to all parts of them, and may vary from the smallest to a maximal degree for either. It is complete when maximal in degree for all fractions, and general when all the concerned cells of the body have acquired it. To become so a corresponding maximal amount of the toxins in all its fractions must have been present in the blood at one time to the end that all the receptors, of all the cells which can anchor it, become fully occupied when all acquire the desired digestive function.

The required maximal amount of the toxins can however only be introduced in normal non-tuberculous subjects. In the tuberculous, the reactions induced could be so severe and prolonged that serious damage may result, or even threaten the patient's life, deaths having occurred in the early tuberculin period from too large diagnostic and therapeutic doses, in unsuitable cases.

I have already referred to "local immunity" in connection with the evolution and destiny of tubercle which accounts for healing of small lesions, such as we find in autopsies after death from other causes. The presence of a local immunity also explains the failure to obtain reactions in the same skin area, where the previous tests have been made, or where subcutaneous injections have been given repeatedly, for therapeutic or diagnostic purposes, of the same toxins. In such instances the local exceeds the general immunity, and without increasing the dose the toxins applied in this locality are promptly destroyed. Unless the same degree has been obtained in other localities the reaction to the same amount or dose of the toxin is positive in the new site.

These specific reactions, whether only local or general and febrile, form the basis for biological diagnosis.

Several methods have been introduced since Koch described his, which in my opinion is still the most reliable. Properly applied it is entirely free from objections, which were overcome when the maximal diagnostic dose was reduced and was approached gradually by beginning with a small trial dose and increasing it at intervals of two days until a reaction occurred.

By proceeding in this manner it was rarely necessary to give the maximal dose, which, according to Koch, is 1 cc of a 1-per-cent solution of tuberculin. Febrile reactions occur as a rule to much smaller doses, and there is then no occasion to proceed further.

To accept the presence of tuberculosis by Koch's method, a distinct rise of temperature of at least one degree Centigrade, occurring within twenty-four hours, or latest within thirty-six hours, with or without general symptoms, is required. To exclude tuberculosis there must be no reaction to the final maximal dose.

When I find such a test necessary, I follow Koch's method but substitute for tuberculin my tubercle bacillus vaccine, beginning with 0.05 cc of a 0.5-per-cent solution, and double the following doses until I obtain a febrile reaction or reach the maximum dose of 1 cc of this solution. I consider the bacillary body substances equally reliable and more advantageous in that the several doses cause an increased resistance against the tubercle bacillus itself, rather than against its exotoxins. In addition we also obtain a local skin reaction at the point of injection, which does not occur regularly with tuberculin, giving thus the information we can obtain by following von Pirquet's method. In a way the latter is more delicate, but it fails to supply the practical information, which the subcutaneous method of Koch gives. The skin test upon a scarified surface is however less reliable than is the intradermal injection of the test fluid, it assuring contact with the cells with a known amount of the test fluid, while upon a scarified surface it may be washed away by exuding lymph or serum, or the scarification may not be sufficient. I also object to the use of undiluted tuberculin on account of the presence in it of 50-per-cent glycerin, which interferes with absorption and does not evaporate as readily as water; it must be rubbed in to make it reliable.

Interpreting a positive skin reaction, it means that the reacting tissue has previously come into contact with one or more toxic products of tubercle bacilli, and that coming again in contact with a larger amount of the toxin than the cells can reduce or destroy, the toxin molecules are reduced only partially. No provisions being available for the cells concerned to complete the process, the partially reduced or split fraction of the toxin causes local irritation and hyperemia, which represents a positive reaction. In its manifestation it corresponds with a *focal* reaction in tuberculous tissue. The living cells in and around the tubercle also become the seat of hyperemia, which in the lung may be recognized by auscultation. I have good reason for believing that the cells concerned are connective tissue cells, their acquired function remaining permanent, in the degree attained; their power to react must also remain so, unless the function is increased, when larger amounts of toxins are required to cause a reaction. It is for these reasons that a positive skin reaction alone cannot be interpreted to mean the presence of tuberculous changes in the subject tested, since the tuberculous lesions can have healed and disappeared while the cell function remains.

A negative result in cutaneous tests is however of important significance, implying that tubercle bacillus toxins have never before come in contact with the local cells, where the test is applied, unless a complete maximal resistance has been acquired by them (which rarely occurs spontaneously), when the test would likewise prove negative.[1]

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[1] In this connection I must however say that my experience justifies me in questioning the foregoing interpretation, which is based upon principles of immunity caused by the absorption of related bacillary toxins. I began to entertain doubts when I found the reaction negative, and when thereafter I proceeded to immunization by gradually increasing doses of the various toxins or their fractions, and finding that such tests remained still negative before the desired immunity had reached a maximal degree, neither were general or febrile reactions observed at any time during administration.

While my observations are limited to about 30 human subjects, they comprise more than a thousand animals, in none of which a skin reaction could be produced before or in the course of administration of the various exo- or endotoxins or combinations of them in numerous and increasing doses. I further found that the reaction remained negative after specific antibodies had appeared in their sera, and that the animals did not resist infection unless these antibodies could be demonstrated in maximal amount by quantitative estimation in complement fixation tests.

Admitting the fact that the results observed in animals need not correspond to those obtained in human subjects, the fact that in the latter my observations correspond without exception with those in animals, and the fact that in all *tuberculous* human subjects as well as tuberculous animals the reaction was always positive, and became negative only after a full degree of immunity was in evidence, justify me in calling attention to this experience, as well as to cause me to attempt another explanation, and especially the one that it is an "anaphylaxis" reaction, an anaphylotoxin having been found as a product of tubercle bacilli which, whether identical with aggressins or not, may both be thought of with Bail and others, to represent a defensive substance produced by the tubercle bacillus against its own injury or destruction. If this explanation should be the correct one, then my contradictory observations would be fully explained.

In further considering tubercle bacillus toxins as a diagnostic agent, there can be no doubt that the reactions are strictly specific, and entirely reliable. By their employment a certain diagnosis becomes possible long before physical methods can accomplish it. Remembering that the histological miliary tubercle is invisible to the unaided eye and only becomes so when it is in a conglomerate form or of the so-called submiliary type, which is still extremely small, before enough such tubercles are formed in the lung and have occupied enough space that we may even suspect their presence by the application of physical methods, we must realize that the local changes produced must be very marked and extensive, and that the Roentgen rays in the earlier period could be of no possible aid. Nevertheless, before an evolution of the disease is reached, which may cause even the slightest changes in percussion or in auscultation, tubercles were no doubt present and were extending for long periods of time. It follows therefore that a truly early diagnosis, without resorting to biological tests, is impossible.

Considering further that the interpretation of physical signs is inferential only, that the signs we elicit need not necessarily mean tuberculous disease, that to observe them requires a good ear and a good knowledge of physics and acoustics, as well as much practice, it is slight wonder that the diagnosis is as a rule greatly delayed, and that many physicians delay it until the advent of destructive lesions, and the presence of tubercle bacilli in the patient's sputum.

In resorting to biological methods all these hindrances and doubts are at once removed, and results resting on an absolutely certain scientific basis can be obtained in the earliest beginning of the disease. The method is at the same time simple and easily applied by any practitioner, or even by an observant nurse, who has been properly instructed. All that is required for the subcutaneous test is the test fluid, the ability to measure and to inject it subcutaneously, and the use of the fever thermometer.

Surely this is but little, when compared with other diagnostic methods in tuberculous or other diseases, and I wish here to state emphatically that until biological reactions are resorted to generally, for the early diagnosis of tuberculosis, pulmonary phthisis will occur in tuberculous persons with the same frequency as it does at the present time. Since we know that tuberculosis has its beginning in childhood almost without exception, I offer the further opinion that all children should be tested by this method.

At the time of the announcement of the discovery of the tubercle bacillus and in the studies preceding it, Koch had already demonstrated that in animal infections it was only the first one which caused progressive tuberculosis. The more or less frequently made subsequent infections were without such result. I had then the opportunity to observe and take part in these experiments, and have since been able to confirm them many times in my own experimentation with animals. There is no good reason to assume that this should not also hold good in the human subject, and if it does, it explains the negative results of some experimenters, like Moeller, who, believing themselves immunized or resistant, infected themselves or others with virulent tubercle bacilli of a human or bovine type, without producing tuberculous disease. It also explains the benign course of anatomical tubercle acquired in autopsies upon tuberculous subjects, which heal as a rule completely. In the light of such reasoning, superinfections may not occur in human subjects, and for preventing infection in the first place sputum prophylaxis has been of little or no avail, since practically all the children observed and studied by me gave at least positive local reaction. General reactions were, however, absent in about 30 per cent to what I knew to be a full immunizing or maximal diagnostic dose of my vaccine, showing that their tuberculous lesions had already healed

or become obsolete, or were sufficiently protected by fibrous encapsulation that the vaccine could not gain access through the circulation.

In the consideration of active immunization, or what may be called specific treatment of tuberculosis, and in the light that we are still without any drug or germicide that like salvarsan could directly destroy the tubercle bacillus, this method is the only one available. The degree of success obtainable depends upon the stage the disease has reached and upon the tubercle bacillus toxins employed. If we demand success, especially in the stage of acute febrile phthisis, we certainly lack sadly in our conception of the underlying pathology, since purely tuberculous changes alone can be influenced by specific therapeutic methods; otherwise the methods and the disease itself would not be specific.

If we designedly or ignorantly resort to tubercle bacillus toxins, which do not represent the whole of the bacillary body substances, or depend upon metabolic toxins for our results, we may accomplish them in part, but only indirectly, as we did with Koch's lymph and with tuberculin, by producing reactions in tuberculous tissue, thereby causing absorption of one or all of the essential endotoxins from the reacting lesions, so far as they were available. This represented in fact an autoimmunization similar to that attempted by exercise, which may be followed by febrile reactions in consequence of increased absorption of toxic products from tuberculous lesions. The latter procedure is equally unreliable and still less scientific, in that we cannot know the nature and amount of the absorbed toxins, while in the administration of tuberculin we can at least control the dose and can reasonably assume that it probably contains, however small the amount, some of the body extractives which were liberated during the maturing of the liquid culture, and in the course of its concentration.

All the body constituents being required, a tubercle bacillus emulsion naturally suggested itself, and Koch acted on this principle when he made his Tuberculin R, and subsequently his "New Tuberculin," both preparations being emulsions. Either of them, or any other tubercle bacillus emulsion, requires, however, disintegration of the contained bacilli to a molecular state and presupposes that this will occur after their injection. The normal organism certainly cannot accomplish this, the dead bacilli acting simply as foreign bodies, and if living would cause the infection against which we wish to protect. The only question then is, Can the *tuberculous* organism, by reason of some degree of immunity having been acquired, accomplish their solution? If it occurs it certainly must be incomplete, unless the emulsion already contains the endotoxins in solution, which in part I found actually the case, when after the emulsion was filtered through porcelain the filtrate contained a small amount of water-soluble proteids, but none of the other fractions could be demonstrated.

In my use of Koch's and my own emulsions in immunization of normal animals their treatment took much longer, and I never succeeded in obtaining a complete and maximal result in complement fixation, with all partial antigens. Infections, after long and tedious treatment, in which large doses were reached, caused tuberculosis, with only one or two exceptions. While I have never had reason to substitute tubercle bacillus emulsions for my vaccine, in the treatment of my patients, I had opportunities to test out such who had previously been treated with tubercle bacillus emulsions and various tuberculins for longer or shorter periods of time, and my observations in tests for immunity or of the clinical results observed gave me no encouragement.

Unfortunately the opinion is still prevalent, and it is still held by certain authors who should know better, that old tuberculin, its modifications, emulsions of tubercle bacilli and their solutions are identical in their action. If this were true, the chemical constituents of any of them and their molecular and atomic grouping would also have to be identical, which any one

versed in organic chemistry should be able to determine. It would negative well-established biological principles upon which the whole subject of immunology is based, and which have been applied in certain questions in criminology with enough certainty that upon observed reactions and results the highest courts did not hesitate to convict and inflict capital punishment or to acquit the supposed offender.

The facts are that with the different proteid factions and the lipoids, which I have isolated from tubercle bacilli, I have been able to produce a maximal amount of specific antibodies against each one of them separately, and with their proper combination in a maximal single dose, or by gradually increasing doses, the same result against all of them. In the latter case the fresh serum, in its active state, destroys the virulence of tubercle bacilli[1] and causes well-marked morphological changes in them *in vitro*.

From my practical application of the foregoing well-established facts, in thousands of tuberculous patients and in many animal experiments, I can positively assert that an active and a full degree of immunity against the bacillus of tuberculosis is not only possible of attainment, but is, and has been, accomplished and demonstrated for a number of years past, not only by myself but also by other observers.

Neither is there a theoretical reason why it should not occur in tuberculosis the same as in other infectious diseases, none of which could be recovered from but for the specific resistance which develops against either their toxins or against the related bacteria themselves, and which we call active immunity. Every spontaneous recovery from tuberculosis and the chronic and often very slow course of the disease can be explained satisfactorily in no other way. In my clinical work I can claim that as far as I have knowledge and have been able to ascertain, no patient who at the time of treatment had not reached the open stage of phthisis has since developed it or has in any way relapsed. I can make the same claim for all such children who received one or more doses of the vaccine and who on their dismissal failed to react to the amount of vaccine which I consider a maximal dose for their respective ages. My observations in childhood tuberculosis date back to 1902, when my first attempt was made for protecting children against infection; and in adults to 1896, when I first acted upon the principle that the body substances of the bacillus rather than their metabolic products were essential for producing or increasing the desired specific resistance or immunity.

The treatment of tuberculous disease of adults is based and carried out upon the same lines and principles as have governed me in children. The tuberculous changes are as a rule greater and likewise older, and have more often assumed a fibrocaseous character, and their treatment requires longer time.

The danger to patients in the so-called closed state arises chiefly from destructive processes in old caseous lesions, and consequently from the advent of pulmonary phthisis. In the origin of this stage, the older views, of the so-called predisposing causes, deserve attention, but only as exciting causes for phthisis, and not as predisposing to the acquirement of tuberculosis.

In advanced and complicated febrile cases of phthisis, absolute rest in bed, maintaining of nutrition by proper feeding, correcting as far as possible gastrointestinal disturbances, and attention to mixed infections should have our first attention. If physical examination indicates that the lesions are freely draining, that softening is not in progress in adjacent parts, or in the opposite lung, and caseous pneumonia can be excluded, it is probable that the fever does not stand in relation to the absorption of tubercle bacillus toxins.

[1]While for reasons well understood by me, but which I prefer not to enter into here, these results were denied in a certain report on the subject, they were confirmed thereafter in London and the results published in this country in the *Medical Record*, vol. 90, 1916, No. 4, p. 135, and in a Senate Document No. 453, 1st Session, 64th Congress. The successful protection of guinea-pigs and the bactericidal action of sera from treated persons has since been confirmed in this country also by an independent observer, who published his findings in the THERAPEUTIC GAZETTE, May 15, 1919, p. 314, where, and in a previous communication in the same journal of May 15, 1917, p. 308, he also reported his personal clinical observations, following the use of the vaccine.

The utility of specific treatment must depend upon the prognosis of the non-tuberculous complications, and if we believe that they can be controlled and recovered from no time should be lost in initiating it, which, to say the least, could do no harm, if our estimate concerning the prospects otherwise should be incorrect.

If excessive absorption of bacterial toxins, regardless of their origin, appears to stand in relation to the fever, which absolute rest has not sufficiently removed, and the administration of vaccines for the so-called mixed infection has also proved inadequate, lung compression appears the one effective remedy left us; the resort to it is however often contraindicated, because of the extensive destructive changes in both lungs, or because the opposite lung may be the seat of tuberculous and other changes too extensive to carry on the function of respiration. Finding that we are justified to make a trial of lung compression and having succeeded thereby in overcoming the febrile toxemia, specific treatment may be resorted to with the expectation of aiding materially in the patient's further improvement and eventual recovery.

Acting upon the principles heretofore considered, I have, as already stated, obtained permanent recoveries in all cases of purely tuberculous processes in the lungs or elsewhere, and in over 60 per cent of more or less advanced cases of phthisis. Many phthisical patients, in which a complete result was not obtained, were improving when their treatment was discontinued, and in some of them a lasting recovery would probably have been accomplished if enough time had been given for additional efforts. I may here add that my present requirements for an "apparent recovery" are: that the patient's physical examination of the lungs must show no râles or other evidence of disease, must be free from all symptoms, and the general health must be restored; and that the changes still present can be only such which we must expect if fibrosis and cicatrization has occurred. In addition, intradermal tests with all fractions of our vaccine and Koch's old tuberculin must have become negative.

In summarizing my reply to questions 7, 8, and 9, I submit that I do not use tuberculin therapeutically, but instead employ the body substances or so-called endotoxins of the tubercle bacillus in solution. I withhold it when a febrile toxemia is present, which is attributable to excessive absorption of endotoxins, in acute miliary tuberculosis and in acute phthisis. My beginning dose is 0.05 cc; the increase depends upon the presence or absence of specific reaction, and the interval is five days after a general or focal reaction has subsided. Local reaction at the site of injection is not taken into consideration. Non-reacting doses are increased, and the treatment is continued in increasing doses, until double the amount for the intradermal diagnostic dose of all fractions of the vaccine has become negative. There is no maximal dose which cannot be exceeded, or which necessarily must be reached. In diagnosis I use the same vaccine for both intradermal and subcutaneous tests.

Regretting that it is impossible to enter into greater details, or to give case records for illustration, I can only add that our sanatorium and its laboratories have always been and are still open to interested physicians for inspection and observation and for our demonstration of the correctness of what I have felt justified to claim. Furthermore, we continue to supply our vaccine against tuberculosis to organized charities free of cost, in order to enable those in charge to judge of its value.

The Use of Glucose Intravenously in Certain Postoperative Conditions.

VALK, in the *Virginia Medical Monthly* for October, 1921, states that there is a certain group of cases in which there is present a definite postoperative acidosis with that distressing feature of persistent nausea and vomiting which is most disconcerting to the patient as well as the surgeon, in which he has been using glucose intravenously with very gratifying results. These

patients are, of course, unable to take fluids by mouth (and as a rule do not react to proctoclysis with any degree of satisfaction. Acetone is usually present, and at times diacetic acid may be found in the urine of these patients. In fact the condition is one of a vicious circle in which the primary nausea and vomiting is reflex or toxic, but soon becomes the nausea and vomiting of a true acidosis with necessarily a decrease in the urinary elimination that practically always shows a moderate trace of albumin and casts.

It is this type of case in which he advocates the use of glucose intravenously, and it is really surprising to note the marked improvement in such cases after its use. The reaction that follows the administration of glucose intravenously is mild or no general reaction may be noted. However, as a rule, shortly after giving this into the vein, there is a moderate amount of sweating and the skin feels moist over the entire body. This may reach a profuse sweat. Along with this there is generally noted a fall in temperature, if this is elevated, probably due to the elimination through the skin as well as the urinary system, and the patient will state that he or she feels better. The drop in temperature is not immediate, though this usually manifests itself within a few hours. The pulse usually shows a moderate drop in rate, though this may be slightly accelerated initially. The blood-pressure is not materially influenced by glucose, although there is usually an immediate drop of about 10 millimeters of mercury.

Greatest of all is the marked improvement in the urinary output, which generally takes place rather quickly, within three to four hours, and may last over a period of twenty-four hours. If previous to the administration of glucose the urine showed acetone or diacetic acid, this will be found to be greatly diminished, or rapidly disappears. The same is true as to the presence of albumin, which will be found to be diminished—probably due to the dilution of the urine as there is a definite increase in quantity.

The marked improvement in the general appearance of the patient is quite evident, and nausea and vomiting, in most instances, clears up surprisingly.

As to the method of preparation and administration, he has found that a 10- to 20-per-cent solution, made with freshly distilled water, titrated and neutralized with sodium carbonate, filtered and autoclaved on three successive days, is most satisfactory. It is put into 250-cc (8-oz.) bottles, as they are easily obtained and inexpensive.

A small needle, 20-cc Luer syringe, and a three-way stop-cock is all the apparatus necessary, the original bottle acting as a reservoir. The solution should, of course, be given at body temperature. An electrical pump has been devised by which the rate may be accurately sustained, but this is an expensive instrument and hardly has a place in the ordinarily equipped hospital.

The use of this solution intravenously is suggested as an adjunct to the general post-operative treatment, but in cases in which one contemplates its use, we must not wait until there is an overwhelming acidosis present before doing so.

From 250 to 500 cc can be given with safety as often as every six to twelve hours, according to the general condition of the patient. From the known physiological action of glucose given intravenously, it seems very reasonable to advocate the feeding of a high carbohydrate diet to patient previous to operation, as well as the use of bicarbonate of soda during this time. Purgation of patients just before operation causes the loss of much body fluid and in itself predisposes to acidosis, as mentioned by Farrar.

In debilitated individuals, or cases in which one anticipates a lengthy operation with prolonged anesthesia, loss of body fluid, etc., the administration of glucose intravenously immediately before or during operation no doubt plays a large part in preventing subsequent acidosis.

Editorial

PERICARDITIS IN CHILDHOOD.

Pericarditis in its grave forms, fortunately, is not a very frequent manifestation of infection. It seems to be less common in this country than it is in England. Many years ago we were under the impression that this was due to the greater prevalence of rheumatism in England than in the United States, but a collective investigation carried out about twenty years ago by the writer seemed to indicate that rheumatism was about equally prevalent on both sides of the Atlantic.

In rheumatic pericarditis, which is probably the most frequent form, the manifestations of the disease are often called to the attention of the physician by reason of pain, which, by the by, is often referred by children to the epigastrium rather than to the precordium, and by the discovery of a pericardial friction sound when the heart is being examined to determine if endocarditis is developing. The effusion in these cases, when it occurs, is rarely purulent, whereas in pericarditis due to the pneumococcus, which is the next most frequent cause of this disease, and in that which is due to the tubercle bacillus, suppuration is the usual condition.

A valuable lecture was delivered on this subject recently by Poynton, who is one of the physicians to University College Hospital and to the Hospital for Sick Children in Great Ormond Street, London. He calls attention to a number of points which we think are worthy of careful consideration. Aside from examining the patient to determine if a pericardial friction sound is present or to determine if the areas of precordial dulness are enlarged and distorted, he points out that it is important to listen posteriorly to the left of the spine at about the level of the inferior angle of the scapula, where not infrequently a patch of intense tubular breathing is to be found, although below this area the breath sounds, while diminished, may be natural, and this holds true in regard to the pulmonary tissues which are above it. As the condition of pericardial effusion increases, the percussion note becomes dull and extends to the base and the area of tubular breathing also extends downward. As the effusion is absorbed, or if it is removed by instrumental interference, these signs clear up. Their presence may lead to a diagnosis of pneumonia or pleural effusion, but in reality the condition is one of pulmonary collapse.

Unfortunately the sign we have just referred to is not pathognomonic of pericardial effusion, because it is also found in children who have greatly enlarged and dilated hearts. Obliteration of the left intercostal spaces anteriorly with a wavy impulse, widely distributed, and absence of diaphragmatic movement may be additional aids in the diagnosis, together with distant heart sounds or heart sounds which are not audible.

In regard to treatment, whether it be with or without effusion, Poynton apparently has little confidence in medicinal measures. He points out that there are still some who believe that sodium salicylate is a specific so far as pericarditis is concerned if the infection is rheumatic, and that there are others who have no confidence in this view. Personally, he seems to be somewhat on the fence, with an inclination toward the side of those who believe that the salicylates are useless. Of course they are not to be thought of in pneumococcic or tuberculous pericarditis for obvious reasons. Poynton, therefore, quotes Sir William Gull's warning, namely, "not to persecute the child with overtreatment."

As to instrumental treatment or interference, it is interesting to note that Poynton is distinctly in favor of drainage by incision rather than by puncture, emphasizing the fact that in many cases the differential diagnosis, even with the aid of the *x*-ray, between cardiac dilatation and effusion is very difficult. He admits that on one occa-

sion, under his advice, exploration with the trocar and cannula resulted in the heart being pierced in three places, but adds that instead of this error destroying the child, as might be expected, improvement began at once and recovery took place. The writer of this editorial had the same experience many years ago in an adult, the relief of ventricular distention by the paracentesis being apparently advantageous.

In favor of the incision method, as against the puncture method, he points out that the rheumatic effusion is often serofibrinous and difficult to drain through a cannula, and the same thing holds true to some extent at least in regard to purulent effusions. He believes that notwithstanding the desperate condition of these patients they should be operated on under an anesthetic skilfully administered. He prefers to enter the pericardium by what he calls Marfan's route if he is using a trocar and cannula for aspiration purposes. This route consists in introducing the needle immediately below the tip of the ensiform cartilage for three-quarters of an inch and then directing it upward and backward, entering the pericardium through the base. When the incision method is used the ensiform cartilage is removed and the pericardium incised from below. Neither of these measures is to be resorted to, however, if there is any deformity of the chest or great abdominal distention. In such cases he advises that the incision be made to the left of the sternum, carefully avoiding the internal mammary artery when resecting the costal cartilages.

Another factor which is never to be forgotten in these cases in which the diagnosis of pericardial effusion is being considered, is the fact that great thickening of the pericardium with cardiac dilatation not rarely occurs, but in these cases the pericarditis is more subacute in its course, as a rule lasting over a very considerable period of time, and puncture for the relief of fluid of course is futile, because no fluid is present, or in so small a quantity as to be an inactive agent. In such cases the operation of dissecting the pericardium from its adhesions has been resorted to at least as a measure for temporary relief. Indeed, he reports a case in which this was done with so much benefit that for two years the patient was able to walk about the ward, although beforehand even sitting up in bed induced urgent dyspnea.

When the *x*-ray is used in these cases it is not to be forgotten that in addition to the ordinary pictures a fluoroscopic examination is essential in our opinion.

SOMETHING MORE ABOUT SPINAL ANESTHESIA.

We believe that it has come to be recognized that spinal anesthesia is a wise procedure in certain cases, which are rarely met with, and we also believe that the vast majority of practitioners have failed to resort to it because it has not appealed to them as efficient or because they have seen accidents or heard of accidents occurring as a result of its use.

The current literature concerning this subject is far less than it was a few years ago, but in a recent number of the *British Medical Journal* Southam asserts that spinal anesthesia for urgent operations in the aged is of very distinct value, stating that he has employed it in fifty cases in which he believed that a general anesthetic was contraindicated, and that he had no difficulties or complications, although in half this number the patients have been seventy years of age or over. The patients were suffering from various forms of strangulated hernia or other abdominal complications, such as acute pancreatitis and perforated ulcer.

His method consists in preceding the spinal injection with 1 cc of omnopon and 1/300 of a grain of scopolamine one hour before operation. The spinal injection consists of 0.05 of stovaine and glucose in each cc of solution, of which he generally employs 2 cc.

There is a further point in his report which seems to us to be of very great importance, and although he mentions it,

it would appear that he scarcely attaches the importance to it which we do, for he tells us that there is a "considerable fall in blood-pressure following the injection due to the loss in tone and dilatation of the vessels of the alimentary tract and lower extremities;" thus, for example, readings of the blood-pressure taken before and after injection showed a fall of as much as 30 to 40 mm., and for this reason he states that the patient's head and shoulders are only raised sufficiently to prevent the solution reaching and paralyzing the vital centers in the medulla. Further, he states that after operation the patient must be kept flat in bed for several hours until the blood-vessels regain their tone and the blood-pressure returns to normal, and he advises that an injection of pituitrin should be given during this stage. The advantages he claims are absence of postoperative shock, vomiting, and pulmonary complications.

These statements seem to prove that the safety of the method, in the very class in which he urges their use, should be doubted. It is interesting, moreover, to note in this connection that there is the report of a discussion upon operations for hemorrhoids in the same issue of the *British Medical Journal* in which Wilkie stated with regard to spinal anesthesia that he had been effectually deterred from using it, except in very special cases, by seeing in Bier's clinic an unfortunate patient who had been submitted to spinal anesthesia nine months previously and had been paraplegic ever since. That there could have been no fault in the technique in this case would seem likely in view of the fact that Bier has had an experience with spinal anesthesia amounting to thousands of cases.

INTRACARDIAC INJECTION.

Our readers, from time to time, doubtless have been interested in a subject to which we have repeatedly called attention, namely, resuscitation of a patient, apparently dead, by cardiac massage, varying in its application from pressure exercised upon the ribs to abdominal incision with the hand pushed through a slit in the diaphragm. It is obvious that the average surgeon will resort to the latter method only under very pressing conditions, and that this is equally true of the proposition now advanced by some of the French clinicians who report favorably upon intracardiac injection. Thus, in a recent issue of *La Presse Médicale*, there is an article by Cheinisse upon this subject in which he gives references to no less than sixteen authors, all of whom are Germans, concerning this procedure. The intracardiac injections were sometimes used to resuscitate the heart in the collapse following the use of arsphenamine, and in other instances for the cardiac failure which complicates general anesthesia and surgical procedures in general.

The cases brought together seem to prove that such injections are by no means dangerous and may save life.

Various remedies have been employed and different methods have been resorted to; in some instances the injection being given in the lower part of the jugular vein, in others the needle has been driven directly through the chest wall into the heart muscle, and in still others no attempt has been made to give an intramuscular but only an intrapericardial injection.

After disinfection of the skin with tincture of iodine, a fine needle 10 cm. long is introduced in the fourth left intercostal space close to the sternum so as to avoid the internal mammary artery. Entrance to the heart muscle can be determined by the feel of the needle and movement of its external end.

The substances injected have been camphor, caffeine, and digitalis, but it would appear that the most successful results have been obtained from the use of adrenalin, 1 cc of the 1:1000 solution being injected. Indeed Voght reported in the *Münchener medicinische Wochenschrift* of June 17, 1921, 15 instances in which adrenalin had been employed, with excellent results in 9 out of the 15, and in other instances pituitrin had been employed instead of adrenalin.

A point of very considerable interest in

this connection is as to whether the fourth intercostal space close to the sternum is the point of election, since at this point the needle is prone to enter the auricle, if it is distended, or the right ventricle. If the operator wishes to give his injection into a cardiac cavity this might be considered the point of election, but often his wish is to make it truly intracardiac in the sense that the drug is deposited in the heart muscle. If so we would think that the fifth interspace in the nipple line, or just outside of it, would be best, since at this point the needle would enter the muscle of the left ventricle and no further hemorrhage into the pericardium than a very slight leakage from the muscle itself occur, in distinction from that hemorrhage which may occur into the pericardium if the auricle or right ventricle is punctured.

We are ready to admit that this modification of the French and German plan is theoretical, because we have had no opportunity to employ it, but we have thought it worthy of consideration.

MOUNTAIN CLIMATES IN HEALTH AND DISEASE.

Physicians are constantly consulted by those in ill health who very properly believe that resort to climatic influences may result in the disappearance of their annoying symptoms or even in the cure of actual lesions, but we think it may be said, with truth, that general practitioners pay too little attention to climatology.

Many years ago long sea voyages were prescribed for tuberculous patients, and often-times the resulting exposure, lack of proper treatment and of the comforts of home actually hurried the death of the patient. Then island resorts were taken up, and for many years Madeira received a large number of cases of pulmonary tuberculosis, chiefly on the recommendation of English practitioners, although American physicians occasionally sent patients there. Without doubt the climate of Madeira is advantageous to many of these persons, but to a certain extent it has ceased to be fashionable, if such a term may be used, and the high altitude treatment of pulmonary tuberculosis has supplanted that of sea level. For a number of years, however, there has been developed, to some extent at least, a reaction against high altitude treatment. It has even been claimed that fresh-air treatment at home is equally advantageous, and doubtless this is true in many cases, particularly if contraindications to the effects of high altitude are presented by the patient.

It seems to be pretty well established as the result of investigation that residence in a high altitude, as, for example, about 5000 feet, tends to increase materially the number of red blood cells and also the percentage of hemoglobin, and in addition the rarity of the atmosphere requires that the patient shall breathe more deeply and thereby increase not only the flow of air but the flow of blood to portions of the lungs which at a low altitude are not exercised as they should be.

Those who are skilled in treating tuberculosis, however, are well aware that there are many conditions of the circulation, and of the other organs of the thorax, which definitely prevent any improvement from a residence at a high altitude, and, furthermore, may result in actual damage to the patient if residence at such a place is attempted.

An interesting paper is contributed to the *British Medical Journal* by Hudson of Montana, Switzerland, bearing the title which heads this editorial note. It is, of course, written from the standpoint of one who is enthusiastic as to the benefits to be obtained by high altitude therapy, but nevertheless, while emphasizing the great reputation which the mountains have won in the cure of tuberculosis of the lungs, he recognizes that, as with most other therapeutic measures, such treatment has distinct limitations. The class of patient that he thinks is most likely to be benefited is early pulmonary tuberculosis in young, or middle-aged, subjects of good constitution with sufficient resistance and vitality to react

properly with an increased rate of metabolic activity, such as occurs at a high altitude. He also believes that chronic or partially arrested cases also are benefited, particularly if they belong to that type which seem to have come to a standstill, neither getting better nor worse. Those in the third stage of the disease, suffering from toxemia and fever, should never be sent to a high altitude as the mountains hasten the inevitable end.

These are points well worthy of consideration, as the patient and his friends, driven to desperation by the progress of the disease, often cause the practitioner to permit mountain treatment in the hope that it will do good, and they should be clearly informed that it will do serious harm.

So, too, Hudson points out that fact which we think all climatologists have long recognized, namely, that cases with large septic cavities or pleural effusions, or large areas of consolidation, should not for obvious reasons be subjected to high altitude treatment, but he insists, on the other hand, that bronchial cases derive much benefit in a diminution of sputum and, therefore, a diminution in cough.

We think it has long been considered that laryngitis contraindicates high altitude, but on the other hand we believe it is rather the high altitude with dry wind that is contraindicated than a high altitude by itself. In the Engadine, in Switzerland, where Hudson's experience centers, the air is high and dry, but strong winds, such as occur upon our high prairies in western America, do not occur. Thus Hudson finds that laryngitis in its early stages is often most favorably affected, but, of course, advanced destructive tuberculous laryngitis is often not benefited.

Hudson also has something to say in regard to heart conditions in high altitudes. He believes that where compensation is associated with valvular lesion, with ordinary care high altitude such as 5000 feet is not contraindicated, and that often such cases are materially benefited. Of course, if compensation is not adequate, or is just adequate and nothing more, the increased work demanded of the heart at a high altitude contraindicates this form of treatment, as does also chronic pleurisy with thickening and adhesions, since if the adhesions are sufficient to bind down the lungs increased pulmonary activity is not possible.

Last of all we note with a good deal of interest what he has to say in regard to helio- or sun-therapy. We note that his experience leads him to confirm the opinion of others that while sunlight treatment is of immense advantage as a prophylactic and cure in surgical tuberculosis—that is, tuberculosis of the bones and joints—it seems to be definitely contraindicated in pulmonary tuberculosis. At these high altitudes the rays of the sun are much more powerful, even in midwinter, than they are in lower altitudes, for obvious reasons. Great care for this reason must be taken even in surgical tuberculosis that too much exposure to the direct rays of the sun is not practiced. His experience is that such treatment relieves pain, exercises an absorbent effect on local tuberculous lesions such as enlarged glands and trouble in bones and joints, even to the extent of helping to restore movement to ankylosed joints. Indeed, Hudson goes so far as to say that he has seen cold abscesses, if not too big, undergo absorption under the sun treatment. The sun treatment is not to be used if the temperature of the patient rises above 100° at night, and it should be recalled that according to Hudson very fair or light-haired people do not stand the sun as well as darker types.

Reiterating the danger of heliotherapy for actual pulmonary tuberculosis, he insists that exposure to the sun's rays in such cases almost certainly causes congestion of the tuberculous foci with a rise in temperature, increased sputum, and often hemoptysis, old pulmonary conditions seeming to be lighted up.

It is interesting to note in connection with his belief in the therapeutic value of heliotherapy how active an agent he believes it to be. He publishes a schedule which shows

that on the first day he permits nothing more than the exposure of the feet and the ankles for ten minutes; on the second day on the legs to the knees for ten minutes and twenty minutes to the ankles; and so on until at the end of the sixth day he exposes the trunk for ten minutes and the back and front of the legs for twenty minutes each. After this the exposure is gradually increased, all parts of the body being exposed, except the head and neck, for periods of from two to two and a half hours.

TETANUS.

The value of antitetanic serum as a means of preventing tetanus is now universally appreciated by the profession and largely by the laity, to such an extent indeed that in the case of many superficial wounds carefully and promptly treated, in which tetanus rarely develops, the recipients of these wounds are as a routine measure given the antitetanic serum. For instance, the traumata received in an iron and steel industry and at once subjected to skilful treatment are practically never followed by tetanus.

Ashhurst (*Archives of Surgery*, Vol. 1, No. 3) speaking of the pathogenesis of tetanus, states the following propositions may be accepted as proved:

1. The disease is a pure toxemia; the bacilli or their spores may exist indefinitely in the tissues, and no symptoms are produced unless toxins are formed. There are at least three different strains of toxic B. tetani, and more than one non-toxic strain. Moreover, before the toxin can be produced there must be a symbiosis of the spores of tetanus bacilli (and even of the bacilli themselves) with certain other organisms. The simultaneous presence in the wound of the pyogenic organisms has long been appreciated as a predisposing factor of the greatest importance.

In experimental tetanus when small animals are used the form of tetanus ascendens occurs, the disease beginning in the inoculated extremity; though other neighboring parts may become infected subsequently, death usually occurs before trismus and retraction of the head develop. In man the symptoms usually begin first in the muscles of the neck and jaw, no matter where the point of inoculation; subsequently the muscles of the back and trunk are affected, and finally the extremities. This form of disease is known as tetanus descendens. It is a fact that the toxin ascends the peripheral nerves of the spinal cord. The nearer the toxin gets to the spinal cord the more impregnably does it become entrenched in the spinal tissue; and the readier the access of the toxin to the central nervous system, the less is the amount required to kill.

The toxin ascends the nerves by way of the axis cylinders and by way of lymphatic channels of the epi- and perineurium. When it reaches the spinal cord it spreads to neighboring parts of both the sensory side and the neighboring motor regions. If the toxin be injected in sensory nerve roots the animal will die of exhaustion before motor phenomena develop. The toxin also enters the general circulation, but only when this toxin reaches the spinal cord does it produce characteristic tetanic symptoms. The toxin stimulates the motor cells of the spinal cord, with the result that the muscles that these cells control are thrown into tonic spasm; it also renders the sensory side of the spinal cord susceptible to external stimuli, such as the slamming of a door, jarring the patient's bed, a sudden draught of air, etc., which will bring on a clonic convulsion, or intensify, for the moment, the tonic spasm.

Tetanus bacillus is normally found in the intestinal tract of horses and cattle and in that of 5 per cent of man. Wounds contaminated with barn-yard manure or highly cultivated garden soil, or street dust where horses are largely used, are especially liable to be infected. The growth of the organism is favored by anaerobic conditions of the wound, these conditions being always present when there is tissue destruction which implies cessation of circulation. Con-

tused, lacerated and gunshot wounds offer ideal conditions, as do wounds of retained missiles or foreign bodies. Wounds are dangerous only as they are contaminated as the trauma is inflicted.

The first step in the prophylaxis of tetanus is the efficient care of the wound as soon as possible after its receipt. This naturally implies mechanical cleansing and the removal of all dead tissue, next chemical disinfection, for which Ashhurst prefers 3-per-cent solution of iodine. Cauterizing agents are objectionable since they produce more dead tissue.

The second step of major import, but not so vital as the treatment of the wound, is the administration of antitoxin. The three factors to be considered in the administration of prophylactic doses of antitoxin are: the quantity to be administered; the site of the injection; and the frequency with which it should be administered.

The usual prophylactic dose is 300 to 500 units U. S. A.

The standard of the United States government is to the effect that "the immunity unit for measuring the strength of tetanus antitoxin shall be ten times the least quantity of antitetanic serum necessary to save the life of a 350-gramme guinea-pig for ninety-six hours against the official test dose of the standard toxin furnished by the Hygienic Laboratory of the Public Health Service."

The official test dose is one hundred times the smallest quantity of toxin which will kill a guinea-pig within 96 hours; 1500 units is something over 2000 times the amount necessary to neutralize the minimal lethal dose of toxin in a man of average weight. The amount of antitoxin required to prevent death increases in geometrical progression with the lapse of time. After the lapse of one hour 24 times as much antitoxin is required as when antitoxin and toxin are injected simultaneously.

The injection is usually administered beneath the skin. It is better to give it intramuscularly, in the immediate vicinity of the wound, in order to flood these tissues with antitoxin even before the absorption of toxin has begun. The first injection should be given as soon as possible after the receipt of the wound. It is recognized that the quantity injected remains practically undiminished for a week, and then rapidly diminishes to nothing in the course of two days. This injection must be renewed every eight or ten days thereafter until all the necrotic tissues are removed and there is a clean granulating surface. The dose should be the same in the later injections as in the first.

The reason for this is that the tetanus bacilli may not begin to produce toxin for many days after their lodgment, that is, after the first injection has entirely disappeared. Tetanus does develop at times even after the prophylactic use of antitoxin, but it is in the milder form and with a lessened mortality.

Concerning the question of the prophylactic use of serum before late operations in parts that have been wounded where contamination with tetanus bacilli is feared, it has been shown that antitoxin if administered at the time of operation while the patient is under a general anesthetic will produce no shock; moreover, anaphylaxis is extremely rare.

Concerning the treatment of developed tetanus, Ashhurst holds that the most important thing is to get the maximal quantity of antitoxin injected into the patient's body as soon as possible; 15,000 units given within the first three hours after symptoms develop are of more use than 50,000 units given after six hours, or given in divided doses. It should be made a rule to administer the total quantity indicated as nearly as may be all at one time; and after this an overwhelming dose of antitoxin is given, to keep the patient's system supplied with antitoxin, though in moderate amount, until his recovery seems assured. If administered subcutaneously, immense quantities are indicated in the adult. For an adult, with the usual type of case, at least 100,000 units are required in the first twenty-four hours. If administered intravenously a less

amount is sufficient; probably 15,000 to 25,000 units should be administered at first. If injected intraspinally, from 3000 to 10,000 units should be given, according to the weight of the patient. In intraspinal injections from 5 to 10 cc of spinal fluid should first be withdrawn, and the antitoxin solution slowly injected, undiluted.

For intravenous injections it is customary to dilute the serum with saline solution up to a total quantity of 500 cc or thereabouts. This antitoxin treatment cannot reach and has no effect upon the toxin already entrenched in the central nervous system, particularly in the spinal cord. Until its action is exhausted it continues to stimulate the motor and sensory tract and kills the patient by exhaustion. Therefore the function of the spinal cord must be depressed. Magnesium sulphate is regarded as especially dangerous. Confidence is expressed in the efficiency of chloral in doses of 4 to 10 grammes daily; this in conjunction with bromides.

The above summary is taken, much of it word for word, from Ashhurst's paper. Cummings, writing on tetanus in the British army during the European war, states that as the result of his and Major Gibson's examination of records they were unable to find any clear indications of the value of antitoxin injections in tetanus.

Those most largely experienced in war surgery hold that the assured efficacy of preventive antitetanic serum was demonstrated in all armies. It is not infallible. The dose should not be one arbitrarily fixed. It should be larger for wounds of the hands or feet, or frozen feet, for extensive bone lesions, contaminated by soil, and containing fragments of garments or projectiles, with destruction of tissue, and when adequate cleansing and dressing is delayed. Experience has shown that a single preventive injection is not adequate for complete protection when the wounds suppurate or contain foreign bodies. These injections should be repeated every six to eight days, and this should be continued during the entire evolution of the wound. In such wounds further surgical procedure, even if undertaken months afterward, should be preceded by injection of antitetanic serum. This is wisest even though the wound has been completely cicatrized. As to the serum treatment of developed tetanus a comprehensive study shows that sometimes massive doses have seemed to be followed by good results. It is also shown that the question as to the real value still remains *sub judice*.

ALIMENTARY INFECTIONS IN CHRONIC ARTHRITIS.

A further contribution to the subject of focal infections as underlying factors in the evolution of chronic arthritis, and one of great value, is put forth by Mutch (*Lancet*, Dec. 17, 1921) who bases his communication upon an analysis of 200 personally investigated cases, of which half were hospital patients and the other half private patients, so that many different walks of life are represented. Gout, venereal or tuberculous disease of the joints, and all cases of monarthritis, have been excluded, but no other selection has been exercised, and with these exceptions the cases may be regarded as consecutive.

Although uniform infection of the whole alimentary tract is never encountered, multiple areas of infection are often found. They can be divided roughly into an upper zone which includes the mouth and throat, and a lower one which comprises the bowel and its appendages. In the present series active sepsis was present in the throat and nose in 34 per cent of the cases, and around the teeth in 52 per cent, whilst infective streptococci were recovered from the feces of 84 per cent.

Doubtless at times much injurious infection takes place from the tonsils and jaws, but the invasion from the bowel is of a much more serious nature. Numerous instances can be found in which chronic arthritis has commenced many years after the extraction of all the teeth. This had occurred in 15 per cent of the present

cases, the period which had elapsed between the extractions and the onset of arthritis varying from two to twenty years and the average time being eleven years. It is clear that in these patients invasion of the joints must have taken place from some other mucosal focus. Another 16 per cent had had total extractions done during the course of the arthritis, and yet continued to have outbursts of arthritis with the involvement of fresh joints. Almost all the extractions had been done for gross septic conditions.

Critical analysis of the throat histories shows a similar state of affairs. Four per cent of the patients had had their tonsils enucleated many years before the onset of the arthritis, and another 5 per cent had received no benefit from enucleation carried out during the course of the disease. The remaining 91 per cent still possessed their tonsils. If this inquiry is taken one step further it is easy to find patients with continued arthritis who are both edentulous and devoid of tonsillar tissue. The explanation of the failure in the treatment of these patients lies in the persistent infection which was taking place from the lower zones in the bowel and which had been neglected during the cleansing of the mouth.

Anatomically the lower zones of infection can be divided into two groups. In the first group are localized infections. Mechanical agents, such as hard feces, obstructions, stasis, ptosis, and distention with gas, produce foci of depressed resistance through attrition, local poisoning of the mucosa, and interference with the flow of blood and lymph. In these places infective bacteria establish areas of chronic infection in the wall of the bowel. Stercoral ulcers, diverticulitis, ulcerated piles, and chronic appendicitis are common examples of this type of infection. In the second group there is a diffuse infection which sometimes involves the whole intestine from duodenum to rectum, and may or may not be associated with circumscribed zones of special activity such as have been placed in the first group.

Most of the infections are streptococcal, but a few are staphylococcal. In the present series the latter were only 4 per cent of the whole. In this widely distributed group of streptococcal infections are included infections by many different types of streptococcus, and only 6 per cent of the present series were hemolytic. In about one-third of the cases abnormal forms of the colon bacillus of the non-lactose-fermenting or late-lactose-fermenting varieties were found in association with the cocci. In the diffuse infections the streptococci are distributed along the alimentary tract in a definite pattern. In the pelvic colon they are much less numerous than the colon bacillus. In the ileocecal region they become more conspicuous, and at the higher levels are usually present in pure culture.

Chronic infections do not arise in the normal alimentary tract. Derangements, often of a very gross nature, were traced in more than 90 per cent of the present series.

Stagnation is almost universal. Three-quarters of the patients had suffered from constipation for many years prior to the onset of the arthritis, and in almost one-half of these cases the constipation had been very severe. As measured by means of an opaque meal and *x*-rays, stasis was found as commonly in the small bowel as in the large. In the colon it occurred in 89 per cent of cases, the average time taken for the evacuation of the greater part of the meal in these cases being more than three days, while in some instances a week was required. In the ileum stasis was found in 90 per cent of cases. In these the average time required for the ileum to empty, after all the barium had left the stomach, was eight hours, whereas under normal circumstances only three and a half or four hours are needed. Stasis was not so common in the stomach and only occurred in one-third of the cases. The average time taken for the meal to pass through the stomach was eight hours, or twice the normal time. In many of the patients repeated overloading of the colon over a period of years had led to compensatory hypertrophy with elongation. Three-quarters of the patients had long redundant

loops of pelvic colon, and in two-thirds the transverse colon was doubled in length and hung in a tortuous festoon across the abdomen. Many patients had developed secondary obstructions which aggravated the primary stasis. One-half of them had a kink in the last coil of ileum. One-third had a very acute splenic flexure in the erect posture, and as many as 90 per cent had a "last kink" in the pelvic colon. The appendix was examined at all laparotomies, and whenever the opaque meal entered and displayed its shadow on the fluorescent screen. It was abnormal in three-quarters of these cases. Sometimes it was the seat of chronic inflammation, but more frequently it was fixed to the posterior abdominal wall and acted mechanically by interfering with the passage of the food through the last coil of ileum.

Ptosis had occurred with great frequency to the hindrance of peristalsis and the free flow of blood and lymph.

Ferment action was commonly defective and digestion slow, so that much unassimilated food found its way into the large bowel, where it formed a suitable nidus for bacterial activity. The production of an excess of gas affords the most direct evidence of such activity, and 130 of the patients complained of this undue flatus in the colon. A similar proportion complained of gastric symptoms which were of many different kinds and varied in severity from heartburn and nausea to vomiting and acute epigastric pain after meals.

Apart from bacteriological analyses much direct evidence of infection of the colon was forthcoming. Intermittent looseness of the bowels, short attacks of severe diarrhea, and the repeated passage of mucus, were of common occurrence, whilst in a small minority of cases persistent diarrhea replaced the more usual constipation.

Study of this series has shown again and again that stasis and sepsis can exist in the intestine and yet not be manifest without investigation. The bowels may act every day in spite of serious delay in the colon. The residues from the meals of the preceding twenty-four hours are not evacuated, but are stored up by such patients and passed out at the forty-eighth or seventy-second hour, as the case may be. The colon always contains the accumulated débris of two or three days' meals. In other cases the latent stasis is in the ileum, where the food many be retained for twice the normal time before it is passed into the cecum. Such a delay does not of necessity interfere with the regularity of defecation or give rise to discomfort in the abdomen. Marked stasis of these types is at once brought to light by systematic radiography, but cannot be detected readily in any other way. Sepsis in the bowel is just as frequently masked. Even extensive invasion of the bowel by infective bacteria such as streptococci does not always produce diarrhea or any other sign of irritation. The true nature of these cases can only be detected by serological tests and the examination of cultures of the stools.

In brief, it can be stated that stasis often occurs in the colon although there is a daily evacuation; does not refer any symptoms to the alimentary tract; streptococcal infections are often present in the bowel, although there are no symptoms of irritation of the colon; and extensive infection of the ileocecal region does not always lead to the excretion of living streptococci in the feces.

The condition of the alimentary tract dominates the outlook in rheumatoid and osteoarthritis. The general scheme employed in the treatment of the present series of cases has been as follows. The entire alimentary tract was surveyed carefully in each case and an estimate formed of the relative degrees of septic absorption occurring at the various levels. The more accessible areas of infection in the jaws, throat, and intestines were treated surgically, and all the disorders of the digestive tract which had encouraged the development of chronic infection were dealt with. Autogenous vaccines proved of great value when used to supplement these measures. They were prepared from infective bacteria of all the principal zones of sepsis. Streptococci obtained from different foci

in the same patient usually vary in their cultural characters, and each strain was included in the vaccine. Chronic infection frequently damages the thyroid gland. In the present series minor forms of subthyroidism were very common, whilst well-defined myxedema or goitres of considerable size were seen in 14 per cent of cases. There is an intimate association between immunity reactions and the functions of the thyroid gland. The dry extract of the thyroid was given in all such cases with great benefit to the joints. Accurate diagnosis, aided by radiography and bacteriology, makes radical treatment and cure possible.

In the present series of cases, which have been followed for varying periods up to nine years, 89 per cent show very great improvement or complete arrest. Of the failures one-quarter had received very partial treatment only and could not be inoculated with vaccines. If it were possible to exclude those cases in which circumstances such as age, temperament, and position in life prevented the full use of radical methods, the results would have been still more encouraging.

Progress in Therapeutics

Medical Therapeutics

Acne Vulgaris.

In an editorial on this subject, the *Journal of Laboratory and Clinical Medicine* for November, 1921, recognizes that this is one of the commonest skin affections, so common that it has been estimated that 40 per cent of the population suffer from it. By most physicians it is looked upon either as insignificant or as a nuisance, as the case may be, though by some it serves, because of its intractability, as a mere source of income. To the ambitious practitioner it is a *bête noire*.

It is a disease which has, so far as is known, no mortality. It does not incapacitate for work, and yet it is often the cause of unpleasant social situations, and not infrequently it casts a cloud over an otherwise bright and happy career.

Patients looking perfectly healthy except for the local lesions, ask medical advice for the cure of the disease for social rather than for physiologic reasons. If the blemishes one sees on the faces of passers-by on our main thoroughfares are any indication of therapeutic success, then the results are lamentable. Nevertheless the disease is almost without exception readily and promptly cured. One measure depends upon the use of vaccines, preferably autogenous ones. There are cases, a minority one would say, which respond very perfectly to such therapy. But it is often a difficult matter to procure a vaccine. In many cases of acne it is almost impossible to isolate the B. acnis in pure culture, and its growth is slow when it is isolated. Nevertheless it seems true that certain cases are benefited by either a mixed autogenous vaccine, composed of the staphylococcus so frequently a secondary invader of the acne lesion, and the acne bacillus; or one composed of the staphylococcus alone. Cases responding promptly to this latter agent are probably not true acne. Generally speaking, however, the vaccine treatment has been discouraging, as Fox demonstrated in his experiments carried out at Cornell University.

But better than vaccines and infinitely less troublesome to the patient is *x*-ray therapy. LaFèvre, in a report of his experience with this method, covering a period of ten years, and several hundred cases, says that there were but a few individuals who did not entirely clear up, and that these

were improved. His results appear to be the exact reverse of those of Fox.

The writer of the editorial states that he has yet to see a case which has not responded satisfactorily to this form of treatment, but he urges that the amount of the ray used must be judged carefully for each case, after ascertaining what local treatment has been used previously. An erythema should just be avoided. With a careful technique not more than two treatments are required as a rule, and very rarely are more than three treatments needed.

Recent advances in radiotherapy are so numerous and rapid that few physicians know them all. Those who have attempted to keep up find it difficult to choose a conservative middle course between the overenthusiastic and the skeptic. The arguments of one appear to be about as convincing as those of the other. For this reason it is thought wise to call attention to the successful methods which bear the test of practice, and to suggest that, in the case of acne vulgaris, radiotherapy be tried as the first remedy and not as the final resort.

Pneumococcus Peritonitis in Infancy and Childhood.

HEIMAN, in the *Archives of Pediatrics* for November, 1921, states that Whipple has reported good results following the injections of antipneumococcic serum. Of the three cases caused by pneumococcus (Type I), two recovered. He has employed it intensively in four cases (Type I), but without avail.

In those cases that present localized collections of pus all writers agree that surgical intervention should be employed. There has been considerable difference of opinion, however, with regard to the correct procedure in the acute diffuse stage of the disease. Annand and Bowen and Woolsey recommended operation as soon as the diagnosis is made. Kahn and Beaven oppose operation in the diffuse inflammatory stage.

From his study of this condition he believes the best treatment is to give an abundance of fluid by hypodermoclysis and proctoclysis and to keep the patient under the influence of opium during the acute onset of the diffuse process. If the toxemia, as manifested in the temperature, pulse, and appearance, tends to lessen, it is advisable to wait for abscess formation before opening the abdomen. If, however, under supportive treatment, no signs of improvement appear, it is best to resort to surgery.

On the Management of the Chronic Nephritic.

HEROLD, in the *New Orleans Medical and Surgical Journal* for December, 1921, states that unless we have ascertained from a careful history and physical examination that the etiology is in the past, we should look for possible foci of infection; in this we should be conservative. Before attacking any suspected focus we should weigh well the evidence, discuss thoroughly with surgeon, dentist, or laryngologist the possibilities and the probabilities of the clue being right or wrong, and then consider, also, if the good to be accomplished by the proposed focal extirpation would more than compensate for any harm done. He knows a nephritic who was put through the torture of having all his teeth extracted, with little, if any, improvement in the renal condition, but with the great subsequent handicap of being unable to masticate solid food as he cannot get a comfortable set of plates, and, therefore, does without any.

The next point that will surely come up, if the patient be one of means, will be, Where is the best place to go for treatment? On this subject he says he cannot do better than to quote Elliott, who, in answer to the query put to him, at the request of a patient of his (Herold), replied: "Keep patient at home and diet him, yourself." He makes a plea against rainbow chasing so indiscriminately indulged in by this class of cases, and generally encouraged by the attending physician, who, trying to evade

responsibility for the unfavorable termination, which he knows will come sooner or later, tells the relatives that they cannot do better than to take him to Blank Springs, Blank Wells, or Blank Sanitarium. An intelligent wife, mother, sister, daughter, or nurse will, if properly directed, make the food more palatable, the chair or bed more comfortable, and the surroundings more congenial than money can buy at all the resorts in the country.

It is not Herold's purpose to outline the chronic nephritic diets, as these may be obtained from numerous sources. These cases need individualizing; most of them do nicely on a diet with a liberal supply of sweet milk, while others (and especially those with low renal function, and hence retention of toxic products) do not tolerate it. He has under observation at present a case, subject to recurrent spells of nausea and to whom general food is repulsive, that has lived almost entirely for the past ten months on a quart of cream and ten tablespoonfuls of malted milk per twenty-four hours.

On the subject of drinking-water, he refers to what Metz used to call "humbug waters," and feels that he hardly made the term broad enough in its application. All that we need for these cases is pure water; if we want it medicated, we can add the medication. While not denying that many of the mineral springs supply a good diuretic water, Herold contends that for the general run of chronic nephritics good water, clean and uncontaminated, as furnished by nature in the form of rain water, is the best. The mild lithia waters and some of the laxative waters are often helpful, but beware of those heavy with chlorides, especially if our patient has a tendency to edema. Herold always has them avoid "hard waters."

Now, as to drugs: Avoid useless routine medicines, especially diuretics, which are liable to aggravate the lesion, as careful urinalyses will prove; pure water is the best diuretic for most of the cases, and the ordinary patient should be warned against overtaxing the kidneys with even this, with the suggestion, very often, of a "water day" or "kidney-flushing day," once or twice a month, as advocated by von Noorden.

However, we are justified in using drugs vigorously, if we know of an underlying or contributing disease which can be benefited in this way. Herold says he has had some success in advanced nephritis in syphilitics with the intravenous injection of bichloride of mercury; a patient under his care at the present time, with a history of thoroughly treated lues over thirty years ago and upon whom the blood Wassermann is persistently negative, seems to take a new lease on life after a prolonged course on protoiodide of mercury; he contends that the cachexia should be treated, even though, as in this case, the laboratory shows no present evidence of the disease.

Furthermore, speaking of drugs, there is one which stands out preëminently in the advanced cases with palpitation, dyspnea, and anorexia. He refers to morphine. To quote von Noorden, *verbatim:* "I never use morphine in chronic nephritis if there is no special indication. I regard as indication for morphine stenocardiac attacks which rise in the final stages of this disease, and I mean that no other drug is of such good effect under these circumstances." He considers the usual hypnotics absolutely injurious in all cases; as to bromides, they are frequently helpful, especially in the cases with hypertension, but even here they must take their place after morphine, which they do not supplant. Of course, the main objection to a narcotic is its constipating effect; we should guard against this by giving a cathartic as soon as the action of the drug has spent itself (and not while the patient is under the influence of it). We should always be mindful of protective therapy, and, therefore, proper care of the bowels should be impressed upon the patient and attendant.

As to drugs of the nitrite group, he admits that he has used them, and sometimes with temporary benefit in cases with high

blood-pressure. He feels that we should and can, in the great majority of these patients, do without them, by proper handling of the case otherwise. The patient should be properly clothed so as to avoid chilling, and if he be one who attends to business, he should be warned against getting wet. When the condition permits it, he should be encouraged in moderate exercise, in the open air; if he cannot walk, rides in carefully driven automobiles are advisable. Inactivity is obviously bad, except in a very limited number of cases.

Lead Poisoning, with Special Reference to Poisoning from Lead Cosmetics.

BARRON and HABEIN, in the *American Journal of the Medical Sciences* for December, 1921, remind us that lead is the most important of the industrial poisons.

Women are more susceptible to lead poisoning than men; abortions, miscarriages and early deaths of the infants are common.

Lead is deposited in the liver, kidneys, brain, and other organs.

Lead is eliminated principally through the urine and feces, but it may be absent in either even in the very severe forms of poisoning.

The kidneys in some types of lead poisoning show deposits of lime salts in degenerating tubules similar to that found in acute mercurial poisoning.

The lesions in the brain in cases of encephalopathia saturnina are not very prominent. The principal microscopic findings are a mild perivascular round-cell infiltration, satellitosis, neuronophagia, and the occurrence around some blood-vessels of phagocytic cells containing a greenish crystalline pigment.

Basophilic granulation of the erythrocytes is a striking and characteristic feature of most cases of lead poisoning. With proper staining technique this finding is of inestimable value for diagnosis, and careful routine blood studies should be made as a prophylactic measure among the workers in industries using lead.

Besides being an industrial poison, lead is also the source of many miscellaneous forms of poisoning, chief among which is probably that resulting from the use of lead-containing cosmetics.

The use of lead-containing cosmetics over a prolonged period of time may result in death.

A face powder known as flake-white is lead carbonate ground to an impalpable powder. This powder is sold quite generally in drug stores for cosmetic purposes.

Mild degrees of poisoning from flake-white are probably wide-spread, but because the symptoms are often indefinite the true etiology remains undetected. Very severe cases probably also occur and remain undiagnosed.

The present study proves incontestably that death may occur from poisoning due to the use of flake-white as a cosmetic; it is very urgent, therefore, that rigid laws be enacted prohibiting the sale of any compound containing lead for cosmetic purposes.

Studies of Infant Feeding.

BOSWORTH, in the *American Journal of Diseases of Children* for December, 1921, in concluding his paper states:

The calcium and casein in cow's milk are the factors involved in the curdling of this milk by the action of rennin.

An increase in either the calcium content or the acidity of milk tends to toughen the curds produced by the action of rennin.

The calf has a digestive tract which can digest these curds. The digestive tract of the infant fails to completely digest these curds.

The inability of the infant to digest these curds does not indicate an impaired digestive functioning, but does indicate a faulty supervision of the feeding of the infant.

The nature of the curds formed in cow's milk can be controlled by chemical and physical means.

The amount of nitrogen eliminated in the stools of infants may have a relation to the calcium content of the food.

The increase in the nitrogen content of stools from infants may be due to the presence of protein curds.

These protein curds are composed of protein, fat, and dicalcium phosphate.

The protein in the curds is calcium paracasein.

The Action of Quinidine Sulphate in Heart Disease, to Abolish the Circus Movement of Auricular Flutter and Fibrillation.

WHITE, MARVIN and BURWELL, in the *Boston Medical and Surgical Journal* of December 1, 1921, make a preliminary report of a series of cases of disordered heart action treated with quinidine sulphate. Twenty-four of thirty-three cases of auricular fibrillation, and one of two cases of auricular flutter, have been restored, at least temporarily, to normal rhythm at the Massachusetts General Hospital. A continuation of the series is in progress at this hospital and also at the New Haven Hospital.

The action of quinidine sulphate in abolishing the circus movement of auricular flutter and auricular fibrillation is one of the most dramatic in functional pharmacotherapy. The drug bids fair to become a valuable addition to our armamentarium in the treatment of heart disease. Certain definite dangers and our present incomplete knowledge as to the indications for and technique of administration in all types of cases require further study and report before the drug can be recommended for general wide-spread use. It should be given and studied under close observation so that its value may be more quickly learned.

The Therapeutic Possibilities of B-vitamine.

In an editorial on this subject, the *Lancet* of December 10, 1921, states that the absence of B-vitamine from food has hitherto been associated mainly with those severe symptoms collectively grouped together as beriberi; hence this vitamine is often referred to as the antineuritic factor. But though these manifestations are the final result of the long-continued consumption of food entirely lacking or containing a little but not enough of this vitamine, the earlier signs appear to be of even greater importance. McCarrison, who has studied this aspect of the disease with such care in animals and man, considers that the earlier symptoms are referable to the digestive and endocrine systems, and only the later ones to the nervous system. In the early stages he has recorded loss of appetite, indigestion, flatulence, abdominal pain due to gaseous distention of the hollow viscera, headache, giddiness, weakness, coldness, breathlessness; and at a later stage chronic constipation, colitis, appendicitis, intussusception, stasis, and gastroduodenal ulcers. Post-mortem examination showed atrophy of thymus, pancreas, spleen, and all endocrine organs except the adrenals, which were enlarged.

Cramer, Drew, and Mottram record in this issue of the *Lancet* that rats fed on a diet deficient in B-vitamine showed a shrinkage of thymus and spleen, almost complete disappearance of Peyer's patches and lymphoid tissue in general, and a diminution of small lymphocytes in the blood. A state of marasmus is associated with this atrophy of lymphoid tissue, and is apparently the specific effect of the absence of B-vitamine. In concluding from their observations that B-vitamine is not necessary for the life of each individual cell, and that its presence is necessary solely for the normal functioning of lymphoid tissue, the authors enter upon more debatable ground. If the effect of absence of B-vitamine were limited to the atrophy of lymphoid tissue and production of marasmus, such a conclusion might be justifiable, but their theory will scarcely account for the complexity of symptoms in beriberi. The article by Samson Wright in the same issue draws attention to the loss of appetite of animals fed on a diet deficient in B-vitamine, the quantity eaten being dependent on the apparent quantity of B-factor in the food.

Of the three vitamines, the B-factor seems most closely connected with meta-

bolism, growth, and health. Several workers have observed a connection between food assimilation and the amount of B-vitamine in the food, and it is surprising that while each of the three vitamines have long been used as species for certain diseases, the general therapeutic and tonic possibilities of B-vitamine have not been further explored. This subject offers an almost virgin field to the general practitioner anxious to do some useful clinical research. Carbohydrate and fat metabolism seem dependent upon a proportionate amount of B-factor per calorie ingested. This connection suggests the administration of B-vitamine in cases of diabetes to assist the utilization of sugar. The addition of cod-liver oil or butter (fats rich in A-vitamine) to a diet deficient in B-vitamine has been shown to cause loss of weight and ill-health, while an increase in amount of B-vitamine led to assimilation of the fat with renewed health and growth. Cases of marasmus in infants, which had failed to put on weight by the usual treatment, began to grow directly they were given extra B-vitamine. As long ago as 1917 A. F. Hess found that although yeast, which is rich in B-vitamine, apparently possessed little or no value as an antiscorbutic, it proved an excellent stimulant of growth in infants; he showed graphs of infants of under 1 year, 1½, and 2 years old who had maintained an almost constant weight for weeks or months in spite of various changes in diet, and showed an immediate and continuous rise after the administration of autolyzed yeast. In some cases the appetite was stimulated, but in others there was a prompt response though the total food intake was not increased. That the yeast had a favorable effect on the digestive processes was shown not only by the increase in appetite, but by the improved character of the stools.

The chief source of B-vitamine in our food is the seeds of cereals and other plants, but the factor is removed from cereal seeds in the process of milling. Sugar, sago, and other farinaceous products are lacking in B-factor, meat and fish are poor, offal and eggs in comparison rich. Vegetables and milk contain small amounts. The quantity in these foodstuffs is scarcely sufficient to balance the large carbohydrate consumption of white flour in our diet, unless eggs, fruits, and vegetables are eaten in great quantities. The products richest in B-vitamine are the germ of cereals and yeast. Germ as such is not consumed by humans (except in whole-meal bread), and the yeast used in baking bread is not sufficient. Yeast contains B-vitamine in great concentration, and palatable preparations made therefrom can compensate for the lack of B-vitamine in other foods. No ill effects have been ascribed to too great a consumption of foods rich in B-vitamine, and it is likely that certain cases of vague ill health would be improved by the consumption of additional quantities of B-vitamine. There is here a promising field for clinical research.

[Our readers will recall that an exhaustive study of the subject of vitamines was published in the November, December and January issues of the THERAPEUTIC GAZETTE in its Original columns.—ED.]

Treatment of Sciatica by Camphor in Oil Injections.

RAO, in the *Madras Medical Journal* for September-October, 1921, states that camphor in oil solution is made by first dissolving the camphor in ether and then adding the solution to sterilized olive oil. The solubility of camphor in ether is 1:2 to 7. The solution must be quite clear before it is added to the oil. The dose of camphor may vary according to the purposes for which the solution is used. In a case which he reports, he used a solution containing ½ grain of camphor in each cc. The first dose was 3 cc and was given with the usual antiseptic precautions. The injection was made deep into the gluteus muscle of the affected side. It is not made near the nerve trunk, but given into the muscle slightly away from the nerve.

There is one point to which he makes special reference. Olive oil is fairly heavy oil with a large "drop." Hence it is

necessary to choose a needle of large bore for injecting the solution. It is impossible to inject the solution with a needle of small caliber.

The injection was repeated every day, the doses for the second day being 4, 5, 6, and 7 cc, and 7 cc for the third day, so that six injections in all were given. The relief to the patient was great and commenced to be perceived from the third injection onward. The patient, who was bedridden, was able to walk about and only complained of some numbness in the limb. She never got the paroxysms of pain which were so frequent and agonizing on admission. Four days after the last injection the patient complained of some slight pain again, and two injections of 6 cc each were given. The patient was then free from this pain and was walking about the ward attending to her own needs.

The Symptomatic Treatment of Pneumonia.

In the *Journal of the American Medical Association* of October 15, 1921, MEANS and BARACH, in summarizing their article on this subject, state that rational symptomatic treatment must be based on a clear understanding not only of the morbid anatomy but also of the morbid physiology of the disease concerned.

In pneumonia the outstanding feature is the respiratory battle. A great strain is thrown upon both respiratory and circulatory mechanisms.

The respiratory strain results from the circumstance that the pneumonia patient is simultaneously confronted with a necessity for a greater pulmonary ventilation than under normal circumstances, and a pulmonary bellows of reduced efficiency with which to accomplish it. He has a greater ventilative demand and at the same time a decreased ventilative supply.

A number of factors contribute to this vicious state of affairs. Increased metabolism, acidosis, deficient circulation, and anoxemia may increase the demand for ventilation. At the same time, decreased vital capacity due to consolidation, edema or pleural pain, or abdominal distention may decrease the capacity of the pulmonary bellows.

We can directly meet some of these indications. Acidosis, if present, we can correct by alkali administration. Alkali administration also may be hoped to help the non-acidotic case because it raises the bicarbonate level of the blood, which in turn makes it possible for the patient to get along with a reduced pulmonary ventilation.

Anoxemia, which is frequently present and which has a variety of injurious effects, may be corrected or relieved by oxygen administration.

Both these measures—alkali administration and oxygen administration—must be carefully and intelligently controlled. Bicarbonate should be given only in amounts sufficient to turn the urine alkaline to litmus. If pushed further than this, it may do harm by producing alkalosis. Oxygen should be given with one of the modern types of apparatus, and often nearly continuously by a specially instructed nurse. Its continuation is to be governed by the effect on the cyanosis and the comfort of the patient.

These measures are supplementary to specific therapy. When used, however, they may be expected to spare the patient several avoidable burdens and leave him free to devote his entire energy to the fighting of his infection, thus, theoretically at least, improving his chance of recovery.

Relief of Pain in Labor.

In the *Ohio State Medical Journal* for October, 1921, GILLESPIE states that the common experience is to have pains come in a rhythm of three. A hard pain is followed by a feeble effort, this by one of moderate force, and then again comes a powerful contraction. When it is observed that this rhythm is present the anesthetic, and the patient's voluntary efforts, should be regulated accordingly. Progress will

only be made during the strong pain, and the discomfort will be greatest at that time, hence a larger dose should precede this pain, and most of the voluntary effort of the patient should be concentrated at this time. If the pains come in a rhythm of five, artificial assistance should be thought of.

Some men blame chloroform with suspending labor. It is true that if the patient is tired, the administration of chloroform may appear to suspend labor. This effect is but transitory, and after a few minutes of tranquil rest the contractions will return with increased vigor. If there is more than a transient suspension of contractions the chloroform is being unskilfully given.

One who has learned anesthesia in surgical practice will seldom be a success at obstetric anesthesia. The hardest thing to teach an interne, a surgeon, or a nurse who has been accustomed to give anesthetics, is to give all the chloroform at the onset of the pain. The temptation seems to be irresistible to make the administration continuous, or to delay giving it until the height of the pain, when the patient will be engaged in seeking relief, instead of adding her voluntary forces to the expulsive efforts of the uterus. In either case progress will be retarded.

Any agent capable of obtunding sensibility in the second stage of labor will lessen the reflex stimulus to contraction, in direct proportion to its pain-relieving effect. If the voluntary efforts do not take the place of the involuntary force, progress will be delayed; but increased comfort renders it possible for the patient to work better, and in properly managed cases progress is more frequently advanced than delayed.

In surgical anesthesia with chloroform, the agent is added drop by drop, and requires the constant attention of the one giving it. In obstetric anesthesia it is given at intervals of several minutes and by one who has other things to watch, hence there is difficulty in keeping track of the drops. If the mask is covered with linen, the wet spot can be seen even at considerable distance, and one soon learns to gauge the amount given by the size of the spot. In general terms a spot the size of a dime, at the beginning of a pain, will give relief at the beginning of the expulsive stage. This is increased to a spot the size of a nickel as the pains become stronger and the voluntary effort is greater, and as the external parts yield before the advancing head the amount is increased until momentary complete unconsciousness is produced as the head escapes.

If one is opposed to anesthesia he may frequently avoid the extra trouble by using ether, for it will enable many women to bear the troubles they have rather than to substitute the discomforts of partial ether anesthesia.

There are a number of objections which have been made to anesthesia in labor that have deterred some practitioners from employing it, especially in small communities where one's neighbors are opposed to the practice.

It is said by some to predispose to postpartum hemorrhage, and he has known able men who maintain that in the few cases in which they gave it the percentage of postpartum hemorrhage was high. Such men only give anesthetics to women who are exhausted, and exhaustion is the chief predisposing cause of hemorrhage.

He who, as a routine, gives anesthetics throughout the second stage of labor will, by warding off exhaustion, prevent postpartum hemorrhage. On the other hand, experience has taught that anesthesia following delivery is exceedingly dangerous. There is no longer anything in the parturient canal capable of stimulating uterine contractions, and anesthesia, at this time, will produce such a large percentage of postpartum hemorrhage that no question can arise as to the part played by the anesthetic.

To guard against this danger and yet spare the woman pain, he is in the habit of immediately placing all silkworm stitches, clamping them, and tying, after the placenta is delivered.

In a bad tear, requiring careful and extensive repair, the uterus should be thoroughly ergotized before the anesthetic

is given. There seems to be little difference what agent is employed: any anesthetic given after delivery predisposes to hemorrhage, but the primary stimulating effect of ether makes it especially safe in the postpartum operations.

Some practitioners are firm believers in the relief of pain during the expulsive stage, but ignore in practice the sufferings of the first stage of labor. After careful observation running over many years, in a practice made up largely of difficult labors, he is firmly convinced of the following fact: The relief of pain during a long first stage of labor is more important than anesthesia in the second stage.

It may be laid down as an axiom that in direct proportion to the intelligence of one's management of the first stage of labor, will his troubles in the second stage diminish. This being true, it follows that one may secure more benefits in labor from the intelligent use of analgesics than from anesthetics. Among the advantages secured from the relief of pain during the first stage of labor he discusses but a few. Those who have studied this subject can easily supply others.

It is the exhausted woman who most readily acquires septic infection, because her resistance is lowered. The woman who quickly rallies from the exhaustion of labor seldom develops infection, while the one who remains in an exhausted state for twenty-four hours will usually run a febrile course, and a large percentage of such cases will develop true sepsis. This is not only true of those who have been handled for many hours without proper aseptic precautions, it is true just as certainly, though to a less degree, where every precaution has been taken throughout the labor.

The reasons are obvious. There are to be found in the vaginal tract of most pregnant women organisms capable of producing infection. We need not assume the introduction of infection during labor, for these women are already potentially infected, and may at any time become positively infected, if nature's defenses are broken down. These defenses consist of constitutional resistance to infection and the restraining influence of the normal vaginal secretions.

It was recognized by the early writers that the hot dry vagina was a sign of danger on the part of the mother, and Smellie, more than one hundred and seventy years ago, knew the remedy and gave opium whenever this sign of exhaustion and danger was encountered. Any one with experience in consultation obstetrics is familiar with the hot dry vagina, encountered long before operative delivery is indicated, and he is a poor practitioner if he has not seen this sign of danger subside under opiates. Associated with this condition is always found a state of nervous irritability, amounting in some cases almost to frenzy. It is the nervous exhaustion which produces the hot dry vagina. This condition releases the vaginal microörganisms from the restraining influence of the normal vaginal secretions and promotes septic infection. The patient who has been kept reasonably comfortable during the first stage of labor does not develop the hot dry vagina, unless positive impaction of the head in the pelvis occurs; hence analgesics are a safeguard against infection.

The relief of pain in the first stage of labor is just as different from the relief of other types of pain as is anesthesia in the expulsive stage different from surgical anesthesia. In most other painful conditions, having secured comfort, the patient may rest; in this type of pain the patient must perform the hardest labor of her existence. Hence larger doses are called for than would be needed by a patient under other circumstances, with equally acute pain. To give an eighth or a sixth of a grain of morphine in labor is like practicing Christian Science without prayers. A fourth of a grain is usually an aggravation. If the woman is small or the pain not severe three-eighths of a grain may suffice, but usually one-half grain is the obstetric dose of morphine.

If this is given as soon as the first stage of labor is well started, it will usually carry the patient through the first stage in

reasonable comfort, and the expulsive stage will begin with the woman fresh and vigorous.

Among the many conditions which enable one to fortell a long, tedious and difficult labor with considerable certainty are: (1) disproportion between the head and pelvis; (2) posterior position of the occiput in a primipara; (3) breech presentation in a primipara with a narrow rigid canal; and (4) descent of the head until it is almost in contact with the pelvic floor before labor comes on.

The last condition in a primipara often leads the inexperienced to prognosticate an easy delivery, and after twenty-four hours the consultant is called to find the woman exhausted and conditions practically unchanged.

In such cases hyoscine may, with great advantage, be added to the morphine. If given early, more relief will be secured from three-eighths of a grain of morphine, and one two-hundredth of a grain of hyoscine, than from half a grain of morphine, with the additional advantage of having the patient sleep in the intervals between pains, and sometimes through the pains themselves, until the expulsive stage of labor is reached. If the case requires considerable molding an additional dose of morphine may be required, but after the first dose no hyoscine should be given.

For many years he has never given scopolamine with the morphine, unless he felt certain that more than four hours would elapse before the birth of the child, because of the frequency with which difficult resuscitation of the child occurred when this precaution was not observed. It seemed to be a true narcosis, and the slow, irregular respiration continued for a long time. The advocates of scopolamine are wrong in blaming morphine and absolving hyoscine from responsibility for danger to the child. He is quite convinced by personal experimentation, which has demonstrated two facts: (1) Morphine in even larger doses does not give such a percentage of children who are hard to resuscitate. (2) Hyoscine alone will produce it.

The effects of this combination are so ideal, with this exception, that one who has reaped its benefits in practice is loath to abandon it. No other method produces such ideal results, but having become convinced of its dangers to the child, one is compelled to curtail its application within pretty narrow limits.

Fortunately, by the combined use of morphine and chloral almost as good results may be obtained. If morphine is given to the point of reasonable comfort, but the patient is restless and does not sleep between pains, thirty grains of chloral will usually secure this desirable effect, and in no way unfavorably influence either the progress of the labor or the resuscitation of the child.

If chloral is given alone, it is foolish to expect good results from less than forty-five grains, and sixty is better. If given when the os is actively dilating, it will not be retained if swallowed. The stomach is always irritable when active uterine dilatation is occurring, and chloral is, under the circumstances, as emetic as ipecac. Under these circumstances sixty grains should be given per rectum in three ounces of water and is seldom expelled.

Any of the hypnotic drugs will give some relief in labor. He has experimented with most of them, but always to return to chloral as the most available and manageable.

Treatment of Arthritis.

CHACE, MYERS and KILLIAN, in the *Journal of the American Medical Association* of October 15, 1921, conclude that it may be stated in general that the salicylate and cinchophen groups of drugs show comparatively little difference in their analgesic, antipyretic and "uric acid eliminating" effects. It should be noted, however, that this latter term is not sufficiently inclusive, since these drugs also stimulate, to a lesser degree, the elimination of other waste products.

There appears to be no relation between the therapeutic efficiency of these drugs in

infectious arthritis and their influence on the blood uric acid, a statement which is not generally regarded as applying to gouty arthritis.

In the series of cases here reported, cinchophen and neocinchophen seemed to have a more specific effect in the severe cases of infectious arthritis.

The salicylates have the distinct advantage of producing marked proteinuria and casts when given in large doses. On this account, cinchophen and neocinchophen are the drugs of choice when, for any reason, it seems desirable to favor the kidneys. Furthermore, the latter drugs appear to produce their therapeutic effect through smaller doses.

The salicylates have the advantage of being better assimilated by rectum.

Cinchophen and neocinchophen, particularly when given with alkalies, are better tolerated by the stomach than salicylates. Since neocinchophen is an ester instead of an acid, there is less need of using alkali than with cinchophen. In fact, when given without alkali, neocinchophen does not seem to irritate the stomach.

Although a few cases of marked idiosyncrasy to the salicylates (acetylsalicylic acid), in the nature of an allergic reaction, have been reported, their experience is that patients are more liable to have vasomotor disturbances of the urticarial type from cinchophen; but no serious instances of the latter have been observed.

The Use of Luminal in Epilepsy.

AUSTIN, in the *Ohio State Medical Journal* for October, 1921, in summarizing her article on this subject, states:

1. There is no doubt but that luminal will arrest the frequency and furor of seizures.

2. There are some cases that at best luminal will only ameliorate.

3. There are no pleasurable nor disagreeable sensations associated with the use of luminal.

4. Luminal causes no fetor of breath, nor mental torpor, and no eruptions have followed its use in any case.

5. The possibilities are that luminal may need to be used continuously to control seizures.

6. In some patients 1½-grain dosage at bedtime has caused a suspension of seizures. In other patients the luminal has had to be pushed to the point of control, or tolerance, if in the meantime no outward symptoms occur.

7. An examination of patients taking luminal during a 15 months' period showed no evidence of renal irritation.

8. While using luminal, elimination by bowels, skin and kidney is urged, although no cumulative effects of the drug have been observed.

9. Only one case has been recorded in which prolonged arrest of seizures has terminated in a status epilepticus.

10. In one group of 15 patients using luminal, she finds the seizures for one year have been decreased 42½ per cent. In another group of 8 patients during eight months the seizures have been decreased 60 per cent.

Synergistic Analgesia with Nitrous-oxide-oxygen and Magnesium Sulphate.

GWATHMEY and GREENOUGH, in the *Medical Record* of October 1, 1921, state that their results have been so uniformly successful and compare so favorably with thousands of other cases in which nitrous oxide was used without the synergists that they have no hesitation in giving the full technique at this time, which is as follows:

Two soap-suds enemata one hour apart, or one soap-suds enema followed by a thorough irrigation until the return is clear, are given the night before the operation. A tap-water enema is given early the next morning. If not already in place, a folded sheet is placed under the patient to serve as a lifter at the proper time. The bed is now screened, if in a ward, or the room darkened and quiet demanded. Two hours before the operation a chloretone suppository, grs. xv, is given, after which the pa-

tient is not allowed to leave the bed. A half-hour later a breast hypodermoclysis is given of three or four hundred cc of a sterile and chemically pure 4-per-cent solution of magnesium sulphate at a temperature of 110° F. In one or two instances they have dissolved one tablet "A" novocaine suprarenin in the solution, and this seemed to allay the small amount of pain caused by the distention of the tissues. The whole procedure should be done aseptically, the solution running in by gravity in not less than thirty minutes. They have had no abscesses or sloughs.

A towel is now placed over the face, and every inducement is offered for sleep. The first hypodermic of morphine is given one and a half hours before the time set for the operation, and consists of one-eighth of a grain It may be given in plain water or magnesium sulphate. This is repeated at 15- or 20-minute intervals, until the full amount is given, the average adult receiving three-eighths of a grain. If an idiosyncrasy is present, it will develop before the time for the third dose. Quite often one-quarter of a grain is amply sufficient, especially for women.

At the proper time the patient should be lifted as gently and quietly as possible and placed upon the stretcher, or preferably upon the operating table, and taken to the operating room. Under no circumstances should he be allowed to help himself. When these precautions are taken, he will arrive in the operating room in a quiet and comfortable mood and quite often asleep. If asleep, he is probably analgesic, and in one or two instances the operation has been done by using novocaine for the skin and peritoneum.

However, their best results have been obtained by using nitrous oxide and oxygen. This factor may be considered as representing the margin of safety with this special technique, as it can be withdrawn at any time, leaving the patient analgesic, but usually not unconscious. It is best to apply the mask before the usual preparation for the operation begins, as the gases themselves add considerably to the analgesia. With the mask in place, the oxygen is started at the same time as the nitrous oxide, and at no time should the patient be cyanosed or any attempt made to induce the usual signs of anesthesia. The patient, even before the inhalation of the gases, is almost completely analgetized, and the gases are used only to render the patient unconscious and to complete the analgesia. After the skin and peritoneum are incised, the oxygen may be rapidly increased up to 35 per cent, as the patient will be found fully relaxed, and stertor and cyanosis merely add to the danger without increasing efficiency. The second or excitement stage is absent, unless too low a percentage of oxygen is used and the patient becomes cyanosed. In certain cases the gas and oxygen may be discontinued after the peritoneum is opened, but if rigidity is present it should be immediately reapplied, and again during closure. A continuous administration with a high percentage of oxygen is the most satisfactory.

[A recent report would indicate that magnesium surphate is not safe in that it may cause poisonous effects, with special reference to the liver.—ED.]

The Treatment of Carbon Monoxide Poisoning.

Writing in the *Journal of the American Medical Association* of October 1, 1921, HAGGARD and HENDERSON state that when a man is slowly asphyxiated by illuminating gas, or a dog is asphyxiated in the laboratory, the course of events is as follows: As the blood gradually takes up more and more carbon monoxide, the increasing oxygen deficiency induces an augmentation in the volume of air breathed per minute. This, of course, augments the absorption of the gas. But it has also another effect: it washes carbon dioxide out of the body. The normal stimulus for breathing is the carbon dioxide, which the blood carries to the respiratory center. A time comes, sooner or later, when the lack of carbon dioxide has progressed to a point at which

respiration stops, for lack of this stimulus. This is the way in which death has occurred invariably in their experiments.

If, however, before death, but in profound coma, the subject is removed from the gassing chamber to fresh air, but is not further treated, the condition seen during the next half or three-quarters of an hour is one of extremely feeble breathing. If small samples of blood are drawn and analyzed for carbon monoxide, it will be found that very little of the gas is eliminated during this time. The condition of acute asphyxia continues and is exacerbated by the poor respiration.

Meanwhile the carbon dioxide in the blood, starting from the low figure to which it has been brought by the earlier hyperpnea, gradually reaccumulates to some extent. It is only as this reaccumulation of carbon dioxide develops that respiration gradually returns toward the normal. It may then become again excessive, as is frequently seen in patients; for the loss of carbon dioxide has caused also a loss of alkali from the blood. This alkali must be restored by the body itself, rather than from without. But until it is restored, and until the normal balance of carbonic acid and sodium bicarbonate is recovered, the subject breathes as if he were at a great altitude. Indeed, in this respect his condition approximates that of a man who has been taken to a great altitude in an aeroplane, with forced acclimatization and coma as incidents of the trip. The blood alkali is abnormally low, but this condition is not, as was once thought, an acidosis. Alkali therapy is not indicated. The belief, common just now, that any condition in which the blood alkali is low is necessarily acidosis is, as they have shown, incorrect. It may be exactly the opposite condition.

With these facts before us, we can see what has not heretofore been realized, that the most acute period of tissue asphyxia, the time when the greatest injury is wrought to the nerve centers by the lack of oxygen, is the period of subnormal breathing after removal from the gas-contained atmosphere. The conditions in the body are at first not appreciably better than before removal from the gassing chamber.

When, however, they added 8 to 10 per cent carbon dioxide to the oxygen, an altogether different result was obtained. Under inhalation of this mixture the breathing is quickly restored to normal, or more than a normal amount. With the aid of this full ventilation of the lungs, the mass action of oxygen in the alveoli quickly displaces carbon monoxide from the blood. Certain other changes also occur in the blood, dependent on the restoration of its carbon dioxide, and the recall of alkali from the tissues. Thus, in ten or fifteen minutes the subjects (dogs) are on their feet, virtually restored.

In this treatment they believe that they have the long sought and ideal therapy for carbon monoxide poisoning. But its application will require a rather specialized apparatus. Such apparatus was devised by them for oxygen inhalation for gassed soldiers during the war, but it did not then come into extensive use. Oxygen containing 8 per cent carbon dioxide is not yet on the market. Developments in these matters are under way.

Pituitrin in the Third Stage of Labor.

In the *Boston Medical and Surgical Journal* of October 13, 1921, HEFFERNAN states that his data would seem to justify the following conclusions:

Pituitrin administered at the beginning of the third stage of labor is effective in aiding a prompt and complete detachment and expulsion of the placenta and membranes.

Tetanus uteri with incarceration of the placenta does not occur from the careful use of pituitrin in the third stage of labor.

Pituitrin tends to prevent relaxation of the uterus and postpartum hemorrhage during and after the third stage of labor.

Manual removal of an adherent placenta should not be attempted until at least three doses of pituitrin have failed to produce detachment.

Drug Therapy in Epilepsy.

SMALL, in the *Virginia Medical Monthly* for October, 1921, concludes that before attempting treatment of any epileptic condition, an effort should be made to establish the disorder as being either symptomatic or "idiopathic." If it belongs to the former class the treatment should be specific; if in the latter class, the treatment is necessarily symptomatic.

In "idiopathic" cases the factor of constipation should receive attention. Treatment should be directed toward the three cardinal manifestations of the disorder, viz., convulsions, clouded mental states, and dementia.

For "status," paraldehyde is the drug of choice and should be given per rectum.

For the "cardinal triad," luminal therapy should be given a trial. In his series of fifty cases, eighty per cent responded well to this treatment.

Gonorrhea in Women from the Standpoint of the Diagnostician.

In the *Medical Record* of October 1, 1921, HOAK states that possibly the best way to handle the case is to follow some routine schedule, modifying the treatment, of course, for each individual case as it presents itself. For convenience this may be divided into the treatment by the doctor at the office and the home treatment as prescribed by him.

For instance a patient consults the physician with a case of acute gonorrhea involving the vulva, vagina, and vaginal surface of the cervix.

The patient should be put on the table in the lithotomy position, her parts thoroughly flushed out with some mild antiseptic solution and then examined, care being taken not to carry the infection further up into the cervix. After the parts are thoroughly cleansed they are painted over with some silver solution, such as a 5-per-cent silver nitrate or 25-per-cent argyrol solution, and dusted with boric acid or packed with sterile gauze which may or may not be glycerinated to prevent adhesions. The strength of these solutions may be increased up to 40 per cent in the vulva and vagina if the parts will stand it. The application is best done under gas anesthesia. In the urethra we should not use a solution stronger than 5 per cent because of the sensitiveness of the structures. This should be applied after the urethra has been thoroughly irrigated by means of an applicator through the urethral tube.

If the external os is open and the infection has not extended through it, it may be packed with gauze soaked in a 20-per-cent solution of silvol, which is allowed to remain there twenty-four hours to prevent upward extension, when it should be removed and replaced again by the physician.

The use of iodine in the form of an iodex pessary tamponed with cotton every other day, allowed to remain twenty-four hours, has proved beneficial in chronic stages where there is an extension to the tubes.

The patient should now be sent home and instructed to irrigate the parts freely with a slow return-flowing irrigator, using at least a gallon of some hot mild antiseptic solution at each time. This solution may be a two or three per cent carbolic or bichloride of mercury (1:10,000) and should be used at least three times daily.

A Study of the Early Effects of the Sippy Method of Treating Peptic Ulcer.

SHATTUCK, in the *Journal of the American Medical Association* of October 22, 1921, in summarizing his article, states that the effects on the symptoms, gastric chemistry, evidences of occult bleeding and Roentgen-ray findings caused by the Sippy treatment were studied in twenty-eight cases of peptic ulcer, six gastric and twenty-two duodenal, over periods of from six months to two years.

Twenty-two of the twenty-eight patients have remained free of symptoms throughout of the period of observation. Eleven

patients were followed from one to two years with complete relief in nine, and unsatisfactory results in two. Of the seventeen patients followed for less than a year, thirteen have remained symptom-free and four have not.

Of the seventeen patients studied with the Ewald test-meal or the fractional method, ten showed no marked reduction in acidity, though all but two were rendered free of symptoms. Hypersecretion was detected in more than half of the cases examined. It was reduced by treatment in less than half of the cases, though some cases with persistent hypersecretion were made symptom-free.

Six of the twenty-eight patients showed occult blood in the stools. It disappeared in all cases after three weeks.

In eighteen cases, comparative Roentgen-ray studies were made from six months to two years after beginning treatment. Five of seven patients with duodenal ulcer, followed from one to two years, showed evidence of favorable Roentgen-ray change. Two did not. All six duodenal cases followed from six to twelve months showed some favorable Roentgen-ray change. Six cases of ulcer of the lesser curvature of the stomach were followed. The niche deformity and six-hour residue disappeared during treatment in five of these.

The purpose of this study is not to advocate the value of medical treatment in general, nor of the Sippy method in particular. It is merely to report some of the effects of this method. It is well known that with all the diagnostic help that has come in the last few years, the diagnosis of peptic ulcer, even in the hands of the most skilful, is still subject to error. Apparently, in some cases, nothing short of opening the stomach or duodenum can settle the question. How large an element of error there is in this series of cases Shattuck has no way of knowing. Furthermore, long remissions followed by recurrence of symptoms are so frequent in peptic ulcer that cases should be followed for a much longer period than the average period of observation of this series before making any final conclusions. However, the effects of the Sippy treatment, even in this comparatively small series, are interesting, and this method of study should lead eventually to a better understanding of the value of the various medical and surgical procedures used in treating peptic ulcer.

The Etiology and Treatment of Ammonia Dermatitis of the Gluteal Region of Infants.

In the *American Journal of Diseases of Children* for November, 1921, COOKE concludes that the common erythematous or papulovesicular dermatitis of the gluteal region in infants is caused by ammonia in the diaper and should be classed with other forms of dermatitis venenata. A similar dermatitis may occur in older children who have enuresis, and this, also, is associated with the presence of ammonia in the clothing or bedding wet with urine.

In both infants and older children with this affection, a characteristic gram-positive bacillus has been isolated from the stools in every case examined. This organism is a saprophyte, but has the property of fermenting urea with the production of ammonia. It has been called B. ammoniagenes.

In a series of infants without ammonia formation in the diapers this organism can be found relatively infrequently; in older children, however, its occurrence is not unusual.

The use of diapers impregnated with an antiseptic such as mercuric chloride causes a prompt disappearance of the ammoniacal odor and a rapid regression of the skin lesions.

The evidence presented indicates that "the ammoniacal diaper" and the dermatitis that accompanies ammoniacal urines are dependent on bacterial fermentation of urea. The microörganism concerned is apparently the same in all cases and infests the diaper from the feces. This infestation can readily be suppressed and the ammoniacal fermentation eliminated by the use of antiseptics in the diaper. With the cause thus removed the dermatitis rapidly disappears.

The Treatment of Epilepsy.

WECHSLER, in the *Medical Record* of October 22, 1921, reminds us that in recent years luminal has attained a preëminent place in the treatment of epilepsy and has practically crowded out all other drugs and methods. The glowing reports that one reads from time to time lead one to think that a specific has at last been discovered. At the risk of becoming a heretic his experience does not (in a great measure) anywhere near bear out the reports of the wonderful results claimed for it. That the drug does reduce the number of convulsions and at times even stops them the records of some of his cases will show, but that it is the only drug or even the best drug in all cases is not borne out by his experience. Claims have been made that it is a dangerous drug, but this he does not know. That it has disadvantages one may safely say. That it fails in very many cases one may also assert. He has seen it change grand into petit mal attacks.

Of the fifty-eight patients on which he based his records, all of whom received luminal for varying lengths of time, in doses of three quarters to one and a half grains one to three times a day, eighteen may be said to have had their attacks stopped by the drug.

Treatment of Syphilis.

In the *New York Medical Journal* of November 16, 1921, STEVENS states that there are fewer bad results in the use of the arsphenamines with concentrated solutions.

Syphilis reacts to concentrated arsenicals just as rapidly as with the more dilute solutions.

Reactions occurring with the concentrated solution are usually milder than by the more dilute solution. They come on at once if at all and so may be immediately treated. Adrenalin (½ cc), in every case that shows reaction, fifteen to twenty minutes before administration will prevent a repetition. The nitratoid is the only type of reaction to be expected with the concentrated solution.

Reaction once established in a patient will invariably recur thereafter without regard to dose unless adrenalin is used. After a rest of several months reaction may not follow in cases which previously reacted.

The mercurials are of value when used to the point of tolerance and kept there. This can be done best either by mouth or by inunction. To expect results from most of the doses recommended is an absurdity.

The Radiographic Evidence of the Influence of Cod-liver Oil in Rickets.

PARK and HOWLAND, in the *Bulletin of the Johns Hopkins Hospital* for November, 1921, state that in their studies, which have comprised in all some 50 cases, the results have been uniformly consistent. They feel justified in saying very definitely that cod-liver oil brings about a change in the bones which, if the diet be not too faulty, amounts to complete cure. The change is not noticeable at once, but is readily demonstrable in almost all cases by the end of a month. In two or three months so much infiltration with salts has taken place that the extremities of the bones, except for deformities, are practically normal, and only differences in the finer architecture of the ends of the bones indicate the previous existence of a rachitic process. They look upon cod-liver oil as a specific for rickets and have not seen it fail in any single instance. They have known it to cure the rickets even though the children were dying of some other disease. Thus, one child with a sarcoma lost the radiographic evidences of rickets, those succumbing to the malignant growth, and another child, who was hanging between life and death as the result of a severe thoracic involvement and who finally died of pneumonia one month after treatment with cod-liver oil, did not fail to show calcium deposition in the bones both by radiograms and by microscopical examiation. They know of hardly another drug that in disease exerts so regular, certain and specific an effect as does cod-liver oil in rickets.

The Injection Treatment of Boils.

LAZARUS, in the *New York Medical Journal* of November 16, 1921, says he employs simply five per cent camphor in oil, a mixture which is less irritating and at the same time acts as an antiseptic, astringent, and mild counter-irritant, thereby bringing about greater hyperemia and increased leucocytosis, which aid in an earlier absorption of the infiltrated matter. After the furuncle is aseptically injected it is dressed with an ointment made as follows:

Phenol, m. x;
Ext. ergot, gr. v;
Resorcin, gr. x;
Zinc oxide, gr. j;
Lanolin, oz. j.

Covering this ointment a small sterile dressing is applied and held in place with a bandage, instead of adhesive strappings which have a tendency to produce irritation of the skin and perhaps favor the advent of other furuncles. This dressing is not disturbed for at least two days, when the boil is redressed and reinjected if found necessary and the salve again applied. Usually, however, at the termination of this second dressing no further injections are necessary, except that the use of the ointment is continued until the entire boil has disappeared. Should a core be present at any time of the treatment it will very easily be removed by this method.

Eyesight, Spectacles, and Rifle Shooting.

LLOYD, in a letter to the editor of the *Journal of the Royal Army Medical Corps* for November, 1921, states that in order to obtain the maximum benefit the Toric lens ought to be used, and this should be fitted to a hinged frame, the object being to adjust the plane of the glass in such a way as to make it at right angles to the desired position of visual alignment. Inasmuch as the prone position is the one almost invariably adopted for target shooting, the advantage of the hinge is obvious.

As to the degree of decentering, this depends on the reciprocal position of firer and rifle. Some lie almost or quite straight to the rifle; others at a very acute angle; some very close to the ground; others rest high on the elbows.

Consequently, in fitting glasses for rifle and target shooting, it is necessary to decide the point of displacement of the centering, by actual experiment for each individual firer, in accordance with the personal equation.

For this purpose it is required that the optician lie immediately opposite the firer (who has his rifle in position).

He (the optician) should then carefully watch, and mark the exact place on the glass through which the firer aims, in order to determine the precise decentering point.

He finds that ninety-nine per cent of the rifle-shots who use glasses for optical purposes do not employ decentered lenses, and he is convinced that if the advantage of employing them was better known, much improvement in rifle shooting would follow in those who have to use spectacles.

Antenatal Treatment of Congenital Syphilis.

GREENLEES, in the *Glasgow Medical Journal* for November, 1921, states that the results of the older method of treatment contrast very markedly with those of to-day, when mercury is combined with salvarsan or other arsenical compounds.

He has, at the Royal Hospital for Sick Children, Glasgow, treated 15 cases in this fashion. Undoubtedly other observers have reported larger series, but the fact that some of the families have been under observation for as long as seven years, since treatment commenced, more than compensates for the paucity of the numbers. His results in these cases show 100 per cent of successes, and all those followed up for seven years are quoted in detail and included in an appendix. From his observation the following facts emerge:

In only one instance did the pregnancy, during which the treatment was carried out, not proceed to the birth of a living child, and in that case a difficult labor was undoubtedly the cause. Every child, too, gave a negative Wassermann reaction, and

even when followed up for as long as seven years and examined at frequent intervals has, with one exception, continued to react negatively to the Wassermann test. This case, when tested at the end of seven years, gave a weakly positive reaction. And, further, not one of these children has presented any manifestations of syphilis.

Equally striking with these immediate results, and no less important, is the fact that in spite of no further antisyphilitic treatment being instituted these women continue to bear healthy non-syphilitic children; in some of the cases in as many as three or four succeeding pregnancies. It would seem, therefore, that not only by this method is the highest number of successes obtained, but that it once and for all breaks the succession of syphilitic pregnancies.

It is also worthy of note that although he has not been universally successful in obtaining a negative Wassermann reaction in the mother, a healthy non-syphilitic child has been born, and that it has continued to be non-syphilitic, as evidenced by a persistent negative Wassermann reaction, even when followed for as long a period as seven years.

These results are not isolated, as is shown by the following facts: In 1913 Galliot collected all the available data from different authors, comprising in all 145 cases of women treated during their pregnancies, and with salvarsan alone. Of these, 91 per cent resulted in the birth of a living child.

Adams, of the Thavies Inn Venereal Center, London, has been working at this subject during the last few years. In 1919 he published the results attained with the combined arsenic and mercury treatment in his first 24 cases. Among these cases 11 mothers showed active manifestations of syphilis at the time their treatment was commenced, and in only one of them did he fail to get a living child.

The contrast between the two methods in such cases is striking. Galliot's results, from the use of mercury and potassium iodide, showed 82.6 per cent of dead children; Adams had a mortality of 9 per cent. Later, in 1921, Adams published a further series of 95 cases of syphilitic women treated with arsenic and mercury during their pregnancy, in which he had obtained 93.4 per cent of living children. Could one desire more satisfactory results? —results which open up possibilities of success heretofore unknown.

The only possible explanation which one can suggest for the marked efficiency of this line of treatment is that the *fons et origo mali* is the uterine and fetal placental tissues. It is possible that the proliferation of the spirochetes in these situations produces young and more susceptible organisms, and that the increased vascularity of these tissues favors a more easy access to the spirocheticide.

The birth of a non-syphilitic child, even in the presence of a positive reaction in the mother, is quite in keeping with this explanation, as probably some spirochetes have been left in an avascular tissue, and though able to bring about the necessary serological changes are not getatable by the drug, and, for the same reason, are of no danger to the child.

There can remain very little doubt in the mind of any one who has studied the results of antenatal treatment that so far as congenital syphilis is concerned this method —*i.e.*, salvarsan and mercury during pregnancy—promises us the greatest number of successes. It is a method, too, which is infinitely easy to carry out, and certainly much easier and accompanied by less suffering than results from postnatal treatment.

It should be understood that this method can be quite satisfactorily carried out in the out-patient department and the patient allowed to proceed home immediately afterwards, the only preparation necessary being that the patient take a mild laxative the day before, as, in the presence of a loaded bowel, sickness and headache may result.

The consensus of opinion seems to point to the advisability of using small or moderate doses in treating pregnant women, a greater number of these being given, rather than run the risk of possible sequelæ which are more apt to arise with the larger doses.

The Therapeutic Value of Silver Arsphenamine.

BERGHAUSEN, in the *Medical Record* of November 26, 1921, states that in his experience it has been found more advisable to repeat small doses than to risk the marked reactions which may follow the administration of large doses, unless the tolerance of the individual has previously been determined. In the 133 injections, mostly containing 0.2 gm. and 0.3 gm. each, only three reactions were obtained; two of them were slight, and the other accompanied by loose bowels in a paretic who was unable to tolerate the older arsenic preparations as well as mercury. The initial dose was usually 0.1 gm., followed by 0.2 gm. injection in four or five days, and then by 0.3 gm. in case no reaction occurred. Improvement occurred very readily in those suffering from lues, congenital lues, and cerebrospinal types of lues; some improvement was noticed in 50 per cent of the tabetics. In two cases the intravenous injections were followed by intraspinous injections according to the Swift-Ellis technique, with no reactions.

The patients all express a willingness to take another injection because no severe headaches nor gastrointestinal disturbances follow. Those who previously had been unable to take arsphenamine or neoarsphenamine without the production of symptoms, could readily take this newer preparation and suffer no ill effects. Improvement in the clinical condition was as marked as when the older preparations had been used.

Treatment of Failure of Compensation.

STARLING in the *Lancet* of December 10, 1921, states that although we cannot claim to have obtained a clear image of all the factors concerned in producing the clinical signs of failure of compensation, we are enabled to see the physiological reason for the efficacy of various measures employed in its treatment.

Most important is rest, which not only diminishes the demands on the heart from the arterial side, but by removing the main cause for the return of the blood to the heart enormously decreases the inflow into this organ; and it is inflow which in the healthy heart determines output.

The value of oxygen, when there is any cyanosis, is explained by its action in diminishing the blood-pressure necessary to drive a sufficient amount of blood through the brain, the relaxation of arterioles, and the improved supply to the vital organs of the body, and the direct effect of a proper supply of oxygen in improving the contraction and aiding the reintegration and recovery from fatigue of the heart muscle.

The plethora attending failure of compensation is a reaction on the part of the organism as a whole, not on the part of the heart, and does not assist this latter organ. It may, in fact, be harmful when the heart is beginning to recover under the influence of the other modes of treatment just mentioned. One can therefore understand the beneficial effects of bleeding as a preliminary measure in certain cases of failure of compensation, as well as the value of diminished salt intake.

Another factor of importance in enabling the heart muscle to recover its physiological condition is the circulation through the coronary vessels. In his earlier experiments on the isolated heart-lung preparation he used to put the arterial pressure low, in order—as he thought—to give the heart, under the abnormal conditions of experiment, as little work as possible to do. Many hearts, after the artificial circulation had been established, continued to fail and finally went into delirium or ceased to beat. One day, when the heart was obviously failing, he put up the pressure to 150 mm. Hg, thinking that he should kill the heart outright. Instead of this happening, the heart first dilated widely and beat more forcibly, but as it reacted to the pressure in the arterial system it steadily improved, and both its diastolic and systolic volumes diminished. It continued to beat against this high pressure for hours, so that on all subsequent occasions he has raised the arterial resistance to start with, so that the heart, as soon as it is connected with the

artificial system of tubes, has to contract against a high resistance. In his early experiments the arterial pressure had been insufficient to furnish an adequate supply of blood through the coronaries to the heart muscle. As soon as this was supplied by a temporary rise of blood-pressure, the heart muscle steadily improved and the heart was able to contract against an abnormally high resistance without undue dilatation, improvement in physiological condition being marked by diminished volume, or, as would generally be stated, increased tone of this organ.

Starling is inclined to ascribe the beneficial effects of graduated exercises in heart disease very largely to the improvement of the coronary circulation brought about by the temporary rise of arterial pressure accompanying the exercises. So important is the coronary circulation for the functional capacity of the heart that every medical man should be aware of the manner in which this circulation is regulated. The oxygen usage of the heart is directly proportioned to the work it does, and its oxygen supply must therefore vary within the same limits as its work—*i. e.*, in a healthy heart from 1 to 7 or 10. The most important factor in determining the amount of blood flowing through the coronary arteries, and therefore the oxygen supply to the heart muscle, is the arterial pressure, so that as the resistance to the heart-beat increases there is a corresponding increase in the flow of blood through the heart muscle.

Under extreme conditions of work the flow through the heart muscle may be greater than has been found in any other organ of the body and may amount to 5 cc of blood per minute for every gramme of heart muscle. But the supply of blood and of oxygen is aided by two more circumstances. In the first place, as soon as increased strain is thrown on the heart, or this organ commences to fail, we find an augmented flow through the coronaries out of all proportion to the blood-pressure in the aorta. This is not due to the accumulation of carbonic acid in the blood and must be determined by the formation of metabolites, of which lactic acid may be one, in the laboring muscle fibers. Moreover, the heart has an astounding power of utilization of the oxygen in the blood. When an isolated heart is fed with blood from an asphyxiated animal, we find that the heart removes the last traces of oxygen from the blood, so that the blood from the coronary sinus does not contain one-half per cent of oxygen.

The enormous range of adjustment in the coronary circulation characteristic of the healthy heart enables us to form some idea of the evil results which must follow impairment of the power of adjustment, such as may occur in consequence of disease of the coronary arteries themselves. We may see how rapidly such a failure of adjustment may act on the heart muscle by repeating Cohnheim's experiment of ligature of one main branch of the coronaries. This is almost invariably followed, within a period varying from a couple of minutes to half an hour, by the fibrillation of the ventricles and death of the animal, and a similar result may occur in man as a result of any unequal derangement in the powers of adjustment possessed by different parts of the coronary system.

Hyoscine and Morphine as a Preliminary to Local Anesthetics.

Hurd, in the *Medical Record* of December 10, 1921, states that the preliminary administration of hyoscine hydrobromate and morphine sulphate has eliminated the unpleasant features of local anesthesia which he experienced in the past, and given him a confidence that, no matter how nervous or apprehensive patients may be, there will be no trouble with them at the time of operation.

The operations of otolaryngology usually done under local anesthesia are expanded by hyoscine and morphine to the major group, such as mastoidectomies, laryngectomies, resections of jaw, etc., when general anesthesia is not desired.

Though nearly all cases are ready forty-five minutes after receiving hyoscine and

morphine, some require a longer time to settle down, and some require two or three doses. This makes it impossible to appoint a definite time for the operation, as is required in reserving the operating-room in a busy hospital. He has had a delay of over two hours in some instances.

The routine dose is morphine ¼ grain, hyoscine 1/100 grain. This is usually given after a light meal, administering a second dose, if necessary, after forty-five minutes, usually half of the first dose, though this depends upon whether the patient reacts to one drug more than the other. If so, less of the drug to which the patient reacts more readily, and more of less active drug, is used in the second dose. In 300 consecutive cases a second dose was given in 42 cases, a third dose in 5 cases, and a fourth dose in 2 cases. The third and fourth doses were usually given for long major operations. One of his first patients, a woman, became suddenly very hysterical when he was half-way through operation, and was noisy, laughing and crying, but mainly laughing, for several hours. In this case he had been forewarned of the hysteria, and the next day she did not remember the hysterical outburst, or any part of the operation. Four other women showed some hysteria when the first tonsil was removed, but made no complaint when the second came out. He says he misjudged his patients and had not given enough hyoscine and morphine. They probably would have been all right after a second dose.

Of his early cases, whilst he was using the sitting position, two had marked drop of blood-pressure to 90 mm. systolic; otherwise their condition was good and the operation was finished. In the first case he gave a hypodermic of adrenalin and placed the patient in a recumbent position. In the second case after operation the recumbent position promptly raised the blood-pressure. For the past three years all cases have been kept recumbent during the operation, and, even if the dose is not sufficient, syncope and lowered blood-pressure do not occur.

Previous to three years ago, the hyoscine that he was using did not act as consistently as that which he now uses. There were more cases of delirium, coma, prolonged effect, etc. The hyoscine must be pure; especially, it must not contain apoatropine as an impurity. For the past three years the action of the hyoscine which he now uses is quite as consistent as is the action of morphine. The tablets must be kept dry and fresh solution made at the time of operation, as hyoscine in solution will break down into impure and poisonous by-products in twenty-four to forty-eight hours.

The patients were nearly all good risks, though the poor surgical risks did equally as well. When patients are ready for operation their pulse-rate is reduced, they are sleepy or sleeping and do not want to be disturbed, speech is slow and somewhat thick, cerebration is slowed, they may be somewhat confused, and in moving from bed to operating table they have a staggering gait. The pupils may be contracted (morphine), or dilated (hyoscine). The ideal is midway. The face usually itches; the color is good.

The pulse is taken at the time the patient enters the office for operation, again when the operation begins, and immediately after it is finished. The average pulse-rate in 50 cases was 99 at the time of entering the office, 85 at the beginning of operation, and 85 at the end of operation. This, however, does not show the whole picture, for example, 128-88-84 in a highly nervous patient, and 76-76-72 in a phlegmatic one, might be taken as extremes.

Treatment of Sciatica.

Ott, in *Minnesota Medicine* for December, 1921, states that the technique of epidural injection for sciatica is simple. It has been described quite fully by Cathelin, Strauss, and others. A 10-cc Luer syringe with an ordinary spinal puncture needle is used. The needle is introduced into the sacral canal for from 5 to 6 cm. Care is taken not to introduce it farther, since there is danger that the spinal subdural space may be entered because of the

reflection in most persons of the dural sheath around the upper margin of the second sacral vertebræ. After the introduction of the needle, the trocar is removed and suction made with the syringe in order to be sure that no cerebrospinal fluid escapes. If it does, the needle is withdrawn for 2 or 3 cm. The solution used in the Mayo Clinic usually is 0.5-per-cent novocaine in physiologic salt solution. The solution is introduced very slowly; for from ten to twenty minutes is necessary for the injection of from 40 to 50 cc. Ordinarily 50 cc is sufficient. The injections may be repeated every forty-eight hours if relief is not obtained. At times seven or eight injections may be required. It has been his experience that after the first injection the pain is in most cases relieved entirely for from two to three hours and ameliorated for the next two to ten days, and the patient enjoys a full night's rest.

Of the thirty-four patients treated by epidural injections, fourteen received one injection, thirteen two injections, four three injections, two four injections, and one five injections. Nine patients received complete and permanent relief; fourteen received partial relief, which allowed them to return to work; eleven did not receive any permanent benefit from the injection. Temporary relief, that is, for from two days to two weeks, either complete or partial, was obtained by thirty-one patients.

In the greater number of cases foci of infection were removed, either a few days prior or subsequent to the injection; this was probably an occasional factor in the cure.

The Value of Radium and X-ray Therapy in Hodgkin's Disease.

Bowing, in the *Journal of Radiology* for December, 1921, states this plan of treatment possesses promise, and that from 5000 to 6000 mg. hours of radium are applied to each right and left cervical and to supraclavicular areas, from 2000 to 3000 to the infraclavicular and inguinal areas, and from 1000 to 3000 to the axillary areas. Any palpable abdominal glandular enlargement is blocked off in a manner similar to that described for the cervical area. Mild reactions, such as malaise, anorexia, nausea, and occasional vomiting, are usually disregarded; severe reactions are avoided. Should a severe reaction occur, the radium treatment is usually abandoned for a period of from two to three days or until the patient returns to a satisfactory condition. The fluid intake and elimination are usually encouraged, and soda bicarbonate is given in drachm doses three times a day.

Two to four areas are usually radiated at one time with an interval of two or three days between treatments. A mild or intense erythema may occur after the last application or two or three weeks later. It yields readily to ordinary treatment and lasts for from three to ten days. The part should be kept dry and dusted freely with a good grade of bland impalpable dusting powder. No secondary skin changes are noted, although the natural skin pigments may be increased; this does not necessarily follow an erythema.

Formerly many patients with Hodgkin's disease at the Mayo Clinic were treated by the formula as follows: A broad focus Coolidge tube, a 23.7 cm. parallel spark-gap, skin target 22.8 cm. distance, time six and one-half minutes, 5 ma. of current, filtration 3 cm. of aluminum, and a piece of sole leather. Multiple portals of entry varying in size were used. Treatments were repeated at intervals of three weeks until a series of six or eight had been given. In their present formula the distance has been increased to 30.5 cm. from the skin, time twelve minutes, filtration 6 mm. of aluminum, and a piece of sole leather. The number of portals of entry is limited. One area of both the right and left cervical regions is exposed. The chest is equally spaced in four squares; the size of the opening depends on the size of the chest wall. One area in both the right and left axilla and one area in both the right and left inguinal glands are exposed. The back is divided into eight areas. The upper and lower limits are marked, respectively, by trans-

verse lines at the level of the seventh cervical vertebra and gluteal fold of the buttock. Treatments are repeated every three weeks until a series of six or eight have been given; an interval of three months is allowed to determine whether or not further therapy is indicated.

The *x*-ray treatments are usually given at the beginning or at the end of the radium exposures.

Irradiation of the anterior abdominal wall is avoided, since it may result in very severe reactions, which resemble peritonitis, with marked distention of the abdomen and ileus, associated with abdominal pain. There are frequent foul-smelling, greenish stools. Convalescence extends over a period of six to ten weeks. Mild reactions similar to those following radium applications may occur from *x*-ray exposures of the chest and back.

The two great body cavities and all possible superficial glandular enlargements should be treated with the *x*-ray at the onset of the disease in order to ward off the impending mediastinal and abdominal enlargements, if possible. The initial good results of radium and *x*-ray therapy may be due to the direct destructive effects on the glandular enlargements characteristically composed of an abundance of nuclear substance, lymphoid elements, endothelial cells, and so forth. The large glandular endothelial cells are very susceptible to radiation. Fibrosis, which is nature's method of recovery, is set up by radium and the *x*-ray.

Treatment should be instituted as soon as possible. The anemia should be treated with the ordinary therapeutic agents and all possible foci of infection removed. If the anemia is steadily progressive, radium and *x*-ray treatments should not be given too intensively because of the destructive effects of irradiation. Vaccine and serums are of doubtful value.

In early cases of glandular enlargement, an isolated gland should be removed for examination by a pathologist. The life expectancy of the patient should be increased by intensive radium treatment of the superficial glandular enlargements and deep *x*-ray therapy of the thoracic and abdominal cavities whether or not the roentgenograms are positive. Huge glandular enlargement and mediastinal involvement are markedly diminished. The generalized pruritus may diminish and in some cases may entirely disappear.

The Cardiac Mechanism after Administration of Quinidine in Auricular Fibrillation.

PARDEE (*Medical Record*, Dec. 17, 1921), in discussing a paper by Levy on this subject before the New York Academy of Medicine recently, stated it was a revelation to know that auricular fibrillation could be stopped in 50 per cent of the cases. Now what we desire to know is: "What does it do to the patient?" He has not had the opportunity of following patients with the electrocardiograph, so he cannot speak except in approbation of the work. However, he had been treating a number of cases with quinidine for about six months. He had been unable to maintain any in normal rhythm for the full period; though it had been possible to return them to normal rhythm, they went back to fibrillation. All the patients he had treated were ambulatory cases. He had given them 0.4 of a gramme of quinidine three or four times a day, depending on their toleration as tested by a single dose. He had treated some patients in the hospital with 0.4 gm. every four hours, and these had complained of dizziness, headache, nausea, and vomiting, and were so uncomfortable that he had stopped giving the quinidine at such frequent intervals. Nor did the frequent intervals seem necessary, for quinidine was absorbed very soon after administration, and only one-half of the dose was excreted in the next six hours, so one should be able to produce the effect by giving it at the longer intervals. That the lesser dosage was effectual for the purpose was shown by the fact that he had had the usual percentage of returns to normal rhythm—in fact, 60 per cent—but he attributed the

additional 10 per cent simply to luck. He had not found that digitalis exerted any effect either in favoring or inhibiting the action of quinidine.

All of his patients were under digitalis at the time they were given the quinidine, as it was customary for him to keep cases of auricular fibrillation digitalized. Since in auricular fibrillation they were dealing with a fundamental pathological condition of the auricle, it was not surprising that one could not maintain these hearts at a normal rhythm by the drug. Extrasystoles developed and the fibrillation returned. Some unpleasant happenings had occurred in connection with the administration of quinidine. One patient fell in the street at the time of loss of normal rhythm and return to fibrillation. Another complained of great discomfort. In none was he able to maintain the normal rhythm continuously, but he had not attempted to give the drug continuously because of the symptoms induced. There was only one patient who was better physically when he had sinus rhythm than with the fibrillation. Where with fibrillation his rate without digitalis was sixty or under, and he had frequent dizzy attacks and faint spells, after return to normal rhythm the rate ran about seventy, and he did not have dizziness or fainting.

In one patient quinidine apparently produced harm. The drug was given for the purpose of changing an auricular fibrillation to a normal rhythm; the heart did not go back to normal rhythm, but the patient developed a degree of cardiac failure which made rest in bed advisable. In this case the harm might come perhaps because of the rapid heart-rate which often resulted from quinidine. It might be that quinidine had a direct harmful action on the muscle; he could not say. There were two other patients whose general condition became worse during or just after quinidine administration, though he cannot be sure that their decompensation might not have been due to another factor.

The situation at the present time might be summed up by saying that we have a powerful drug which we do not yet know how to handle properly. When we know how to give it we may be able to maintain the sinus rhythm for a considerable length of time, and we may then be able to accomplish great benefit. It is not necessary to have the patient in bed when the drug is given if the doses are not too large. He has seen no harm result from giving it to his series of eighteen ambulant patients. So he feels that the drug marks a great advance in cardiac therapeutics and hopes that in a short time we will be able to use the drug so as to maintain normal rhythm for a considerable length of time.

Pneumonia and its Serum Treatment.

THOMAS, in the *Journal of the American Medical Association* of December 31, 1921, states that his paper is based on a series of sixty cases of Type I pneumonia treated in St. Luke's Hospital, New York (fifty of them with and ten without serum), and on 550 cases reported in the literature exclusive of the Rockefeller Institute series.

The material collected indicates that Type I pneumonia, however treated, varies in its mortality rate with the time and place of its occurrence, and suggests that it may perhaps be not so frequently fatal as is generally believed to be the case.

Administration of specific serum in Type I pneumonia appeared to shorten the disease in four of the fifty treated cases of the present series. In eight of them, the use of serum, though followed by improvement in the symptoms, appeared to have only a transitory effect. Among the remaining thirty-eight patients, the duration and outcome of the disease did not appear to have been demonstrably affected by the serum.

The average duration of fever among the fifty serum-treated cases was nine and one-half days; among those not treated specifically (ten cases) it was eight and two-tenths days.

Two deaths from anaphylaxis due to antipneumococcic serum are reported in the literature. Ten patients of the present series suffered from anaphylaxis and were

relieved by adrenalin. Of these ten shocked patients, six had previously showed no reaction to dermal tests for sensitiveness to horse serum.

Skin tests with the protein of horse epidermis, as well as with that of horse serum, should precede the intravenous injection of the latter.

Serum sickness followed the therapeutic use of Type I serum in thirty-six of fifty cases. In fifteen, the symptoms were severe. Adrenalin allays the discomfort of the eruption temporarily.

[These results as to the effects of Type I serum in Type I pneumonia, the only type of pneumonia in which good results have been claimed from serum therapy, are certainly discouraging.—ED.]

Surgical and Genito-Urinary Therapeutics

Bone Development in Relation to Bone Transplantation.

NATHAN *(New York Medical Journal,* Oct. 19, 1921) observes that what actually takes place in case of bone transplantation is more or less complete regeneration of implanted bone as it is being absorbed. That is to say, when we transplant bone periosteum or endosteum, we are simply repeating artificially what occurs when bone is being developed. We carry osteoblasts to a favorable locality just as do the blood-vessels that inaugurate osteogenesis in the embryo.

If all this is true, how, it may be asked, are we to account for the fact that bone denuded of both periosteum and endosteum has been successfully used as a graft? Or, what seems even more paradoxical, how can we explain the fact that heterogeneous bone, boiled bone and even ivory have been successfully used as grafts? This is not so difficult to explain as at first appears. It has been shown beyond doubt that such grafts are absorbed or extruded when transplanted into foreign soil. When reimplanted into healthy bone a callus is formed, and in favorable cases the graft is firmly held. When this happens the clinician considers the graft successful. Indeed, Macewen and others consider this evidence that bone denuded of both periosteum and endosteum is viable and continues to live when transplanted. But, as is to be expected from what has already been said, those who have studied the conditions more carefully and over longer periods have found that the grafts themselves are not permanent. The bone corpuscles are found to be disintegrated a short time after the reimplantation, and these, like all other grafts, soon show signs of absorption.

Under favorable conditions, however, osteoblasts from the adjacent healthy bone invade the graft and deposit bone upon or in the interstices of the implanted material; and only when the osteoblasts are present in sufficient numbers and proliferate so rapidly that enough bone is deposited to balance the dead bone lost by absorption, is such a graft permanently successful.

When viewed in the light of these facts, our conception of the biology of bone transplantation becomes clarified. It no longer rests upon the theoretical interpretation of individual findings, but is based upon a definite knowledge of the development of bone and the experimental and histological demonstration of the conditions as they really exist. We conclude then that bone dies when transplanted whether supplied with periosteum or not. The success of the transplant depends upon the development of new bone. Bone is produced solely by osteoblasts. The osteoblasts are always confined to the cambium layer of the periosteum or the endosteum. (The osteoblasts are also found in the bone-marrow.)

Therefore, when the transplant consists of bone denuded of both periosteum and endosteum, the osteoblasts must come from the healthy bone into which it has been implanted. On the other hand, the grafts which retain these structures are already supplied with osteoblasts; and, as these cells are excited to proliferation when in contact with dead bone, the regenerative process is greatly increased in rapidity and extent, and thus the chances that new bone will be developed before the transplanted bone is completely absorbed are greatly enhanced. In a word, regeneration is more certain when the transplant already contains osteoblasts than when these cells must make their way from a distance.

We need then no longer concern ourselves with the theoretical question as to the possibility of successfully transplanting bone denuded of both periosteum and endosteum. It may be conceded that such grafts will be successful under favorable conditions. From a practical view-point, however, it is evident that the graft with both periosteum and endosteum is much more likely to insure a permanent result; a fact that has been borne out by clinical experience and well established by the experimental as well as the histological investigations of many competent workers.

Some Common But Often Unrecognized Obstetrical Difficulties.

Bell *(British Medical Journal,* Oct. 8, 1921) classes under the above heading occipitoposterior presentations. Owing to the fact that this presentation, if left alone, almost invariably rotates into the occipitoanterior position, the frequency of the occipitoposterior position as a primary presentation has probably been much underestimated. Indeed, until we became acquainted with the frequency of it at Cæsarean section, it is doubtful whether we were not inclined to consider the condition as more abnormal than it is.

In a general way it may be said that, if the placenta be on the posterior wall, in a large proportion of all cases the presentation will be the left occipitoanterior, whereas when the placenta is on the anterior wall the presentation is generally the right occipitoposterior. Hence, while there is little really abnormal about the position, difficulty and delay may occur during parturition, even though the other circumstances and conditions be normal. In a large majority of cases rotation from the right occipitoposterior to the right occipitoanterior presentation takes place during delivery, and no interference is necessary. It is, however, most important that the practitioner should recognize the presentation before parturition, and prepare the patient and her friends for a somewhat longer labor than usual. The diagnosis is easily made by abdominal examination, unless the patient be very fat: the profusion of the fetal limbs, the absence of the dorsal prominence, and the position of the fetal heart are the most obvious and significant signs.

When labor is in progress and uterine contractions are frequent, abdominal examination is much less easy. In these circumstances the practitioner must have patience. If, after several hours in the second stage, the head has made little or no progression, a careful vaginal examination with the hand in a sterile glove should be made. It may be impossible accurately to identify the sutures owing to the overlapping of the cranial bones. In such a case the patient must be fully anesthetized, and the hand of the surgeon passed into the vagina. If possible, the head is gently disengaged and pushed upward, and an attempt is made to feel an ear, for the contour of the pinna enables an accurate diagnosis of the position of the head to be made. If there be no doubt that the presentation is persistent occipitoposterior, manual rotation of the head, with manual rotation of the child's body from above, must be practiced and forceps applied to the head.

There are, of course, cases in which the head is so firmly fixed in the pelvis in the persistent occipitoposterior position that it

must be delivered either with forceps or possibly in some cases after craniotomy; but such a difficulty is most exceptional if the position has been recognized early and proper treatment applied.

When the fetus is not born after the expiration of forty weeks of intrauterine life, serious difficulties may occur during parturition. There has been much discussion from time to time regarding the frequency or otherwise of post-maturity. Obvious difficulties exist in the way of statistical conclusions concerning the question, as it is rarely possible to ascertain from a patient the day of impregnation. The date of the last menstrual period, too, is only a general indication. Nevertheless, menstruation is so rarely associated with pregnancy that in a certain number of cases of post-maturity the catamenial history is of considerable assistance.

But it is not only the size of post-mature children that leads to difficulty in delivery, it is also the fact that the fetal head is very much less plastic than normal. There is both disproportion in size and delay in the process of cranial molding.

If there be any suspicion that a patient is "over time," as we say, a close inquiry should be made. The history of the gestation must be carefully studied, and the size of the child, especially of the head—the hardness of which can often also be detected—should be estimated. At the end of ten complete calendar months from the date of the last menstrual period no doubt need exist as to what is happening, provided always the patient has menstruated with perfect regularity except when pregnant.

The treatment consists of the induction of labor. This is best carried out by the intramuscular injection of infundibulin every night and morning for three days, at the end of which time, if parturition has not supervened, a few bougies should, with the most scrupulous aseptic precautions, be inserted between the uterine wall and the membranes. Labor almost invariably follows these procedures within a short time.

When there is gross deformity of the pelvis, such as exists with a greatly flattened rachitic pelvis, with the oblique or the kyphotic pelvis, unmistakable indications of this are to be found in the appearance and mode of progression of the patient; consequently these pelvic lesions are rarely overlooked. But in such alterations as those seen with the non-rachitic flattened pelvis, with the slightly generally contracted and with the simple funnel-shaped pelvis, the state very often escapes detection.

Non-rachitic flat pelvis is far more common than is generally believed, yet, especially in the less severe degrees, it is usually overlooked, and a difficult labor ensues. In the presence of a simple flat pelvis it may be believed that the pelvic measurements are normal; yet, while this is so in regard to the transverse measurements both respectively and relatively, on careful internal mensuration the true conjugate may be found to measure about 9.5 cm. (3¾ inches), but never less than 9 cm. The external conjugate is generally below 19 cm., but this measurement is sometimes not relatively reliable. There is, however, another feature which often conveys an indication of the conjugate contraction, namely, an accessory promontory below the true sacral promontory, which is produced by an overgrowth in the process of ossification between the first and second sacral vertebræ. When, therefore, the practitioner, after making the external measurements, feels this and afterward reaches without undue difficulty the true promontory, he is in a fair way toward an accurate diagnosis.

Generally contracted pelvis is quite frequently encountered, especially in the lesser degrees, apart from rickets. In a majority of cases the smallness of the pelvis is relative to the general growth of the skeleton; that is to say, the justominor pelvis occurs chiefly in undersized women in whom all the bones are light and small. In such circumstances a mistake is unlikely; a small pelvis should be suspected. But it is not only undersized women in whom the generally contracted pelvis is seen, for it may

occur in otherwise well-developed females, and it is in them that there is a great risk of the condition being unrecognized, unless the practitioner make a routine practice of measuring the pelvis of his pregnant patients. An indication of the generally contracted pelvis is at once obtained from the external measurements, all of which are reduced in size. The fact that the pelvis may be disproportionately small in relation to the rest of the skeletal development cannot be overemphasized.

The funnel-shaped pelvis which occurs as a developmental lesion apart from the association of it with other deformities is one to which great importance has been attached by American writers, and about which careful descriptions have been given by Whitridge Williams and others. The essential feature is, as the name implies, contraction of the pelvic outlet with, of course, narrowing of the pubic arch. The typical funnel-shaped pelvis in varying degrees is said to occur in about 6 per cent of all cases in America.

It is now generally believed that this error of conformation is known as high assimilation of the pelvis; that is to say, the last lumbar vertebra is incorporated into the body of the sacrum, making the conjoined bone so much the longer and leading in the process of growth to the deformity described.

When the lesion has not been recognized before labor, no suspicion of it may enter the mind of the practitioner until the fetal head is in the pelvis and fails to make progress in spite of strong uterine contractions.

From the practitioner's point of view, then, all these varieties of pelvic deformity, because they are unassociated with gross disease and because some of the measurements usually made may be normal, are of real importance. It is a sad reflection that so often they escape detection before labor commences. Unfortunately, too, there have been many cases in which repeated craniotomy has been performed without the true state being discovered. There is reason, also, to believe that very many of the difficult forceps deliveries are the result of one or other of the pelvic conditions described. It is essential, then, that the pelvis of every pregnant woman who has not previously had a full-term normal confinement should be carefully measured, and that the mensuration should take into account not only the inlet but also the outlet. Furthermore, it must never be forgotten that the course of labor and the appropriate treatment will be influenced by the size of the fetal head—the relative disproportion between this and the pelvic measurements.

To-day, when Cæsarean section is so safe in skilled hands, this operation shall be considered in good time in preference to the induction of premature labor, which is rarely to the advantage of the child. If the contraction be not very marked, and is discovered only when labor has been in progress for some time, it is advisable to delay the use of forceps and to give the fetal head every opportunity of molding. When safe delivery is impossible, even with the gentle use of forceps, craniotomy must usually be performed. However, in the typical funnel-shaped pelvis, while Cæsarean section is indicated, if the lesion be recognized before parturition, if it be discovered during labor, pubiotomy should be performed, as this procedure is then in the interests of the mother and the living child. If forceps extraction be attempted the infant may be seriously injured, and complete laceration of the perineum is almost certain to occur owing to the fact that before the head can be delivered beneath the narrowed pubic arch it must be forced far backward.

Primary uterine inertia may be due to a variety of factors. Uterine contractions at the onset of labor are usually feeble and infrequent. These feeble contractions are a natural safeguard in normal circumstances against undue force being employed before the course is, as it were, clear—before the second stage of labor has com-

menced. But it is not unusual to see cases in which, without appropriate treatment, labor probably would never reach the second stage.

If a woman once suffers with primary uterine inertia of this character she not infrequently suffers again in subsequent confinements. Uncomplicated primary uterine inertia is due to the insufficiency of pressor substances in the blood. We do not know the biochemical mechanism that precipitates labor, but we do know that the rhythmical uterine contractions are stimulated by pressor bodies; consequently we should be able easily to discover the future possibility of primary uterine inertia before the onset of labor and without difficulty to prevent this abnormal occurrence.

As a matter of fact this is possible if the patient be examined during the last two or three weeks of gestation. Normally at this period the uterus is very sensitive and the muscle contracts readily on simple stimulation, such as that produced by gentle kneading with the hand. If the uterus remains flaccid and tends to sag at the sides without proper central protuberance, there is every likelihood that, unless the condition be remedied, labor will be inert. Confirmation of the condition of primary inertia may be obtained by an estimation of the systolic blood-pressure, which should be higher than normal during the last weeks of pregnancy. Usually the pressure at this time is equal to that of 140 mm. Hg. If then the blood-pressure be found to register 110 mm. Hg or less, there is almost certainly some insufficiency of pressor substances, and this must be made good.

Normally, the amount of the ionized calcium in the blood tends to rise at the end of pregnancy, owing to the lessened demands of the fetus, and these salts greatly influence the tone of involuntary muscle fibers. It is necessary, therefore, in these cases to supply calcium in an absorbable form.

In addition to this, it is advisable to inject intramuscularly 0.5 cc of infundibulin every night and morning for a fortnight before parturition is due.

Treatment of Acute Suppuration.

SANER (*Lancet*, Oct. 29, 1921), because the use of the word drainage has given rise to the idea that drainage is the chief and most important factor in the treatment of suppuration, suggests that this word, *i. e.*, drainage, be eliminated and replaced by "relief of tension," which implies an opening in the line of least resistance in the direction of safety, along which the products of inflammation may escape.

The inflammatory process will take the line of least resistance, whether along lymphatics, blood-vessels, fascial planes, or toward the exterior of the body, and our main object is to make it follow the latter line. In "relief of tension" and in the creation of a "line of least resistance" we thus fulfil a fundamental principle in the treatment of acute septic conditions. The relief must be complete and the line must be maintained, and it is in the maintaining this line that the chief difficulties of technique arise.

The second great principle of treatment was enunciated by John Hilton in the following sentence: "Every deviation from the necessary state of rest brings with it, through pain, the admonition that the patient is straying from the condition essential to his restoration." This stands as a profound truth, and in applying it to the treatment of suppuration it is merely necessary to emphasize the word rest or replace it by immobilization. Only by completely immobilizing an inflamed part are the natural agents given a chance to form their barriers against spread of inflammation and to deal locally with its cause. The word immobilization implies, at any rate, in the case of the limbs, the necessity for an efficient splint. When there is suppuration in the chest or abdomen we can endeavor to assist or at least refrain from interference with the natural efforts to maintain the condition of rest. There has been always a tendency to regard the treatment of acute suppuration in different parts of the body from separate view-points. The physiology and pathology are essentially the same whatever tissue is involved, and the princi-

ples of treatment do not differ except in the minutiæ of detail. Apparently various pyogenic organisms have their preference for a particular soil, but the reaction of the local tissues and the general protective mechanism of the body do not alter, whatever may be the type of infecting agent.

The two great principles, therefore, that underlie the treatment of all acute inflammatory conditions are: (1) the relief of tension and its maintenance; and (2) absolute rest.

A third principle of scarcely less importance is the avoidance as far as possible of superinfection, meaning by this that during any necessary operation or postoperative dressings the strictest asepsis must be maintained. Further, in the treatment of the wound itself, much assistance can be derived from the use of chemical agents to promote the separation of dead tissue or to stimulate the natural reaction of the healthy tissue, while the bacteriologist has supplied powerful means to increase the resistance of the blood.

In every case, when first seen, the affected limb should be immobilized at once, and immobilization can be secured only by an appropriate splint. While for the fingers a straight forearm or internal angular splint may suffice in any spreading infection, a Thomas arm or leg splint is the most satisfactory. From the patient's viewpoint the application of a large splint for what appears a trivial lesion may seem unnecessary; but the apparently trivial lesion has immense possibilities for danger—fingers, limbs, lives have been lost through neglect of this precaution in the early stages. In the majority of cases it will be found that the spread of infection can be controlled by this means. The question of when and where to make an incision in an inflamed area for the relief of tension is sometimes difficult. If the inflammation is localizing itself the main danger has passed and with the limb at rest further spread is unlikely. The formation of pus is a healthy sign that the tissues are reacting strongly. When it has formed, an incision of the same length as the abscess cavity is made, care being taken that the whole cavity is exposed, but no fresh tissue planes opened up. The size of the cavity may demand more than one incision. The splint should not be discarded until all signs of sepsis have disappeared and the wound has commenced to heal.

In those cases of acute septic inflammation of a limb, when in spite of immobilization there is no effort to arrest the spread and no indication of suppuration, one or more incisions over the areas of greatest tension are of the utmost value. Such incisions should open the skin, subcutaneous tissue, and deep fascia, and should correspond closely with the areas of maximum tension, thus avoiding laying open fresh tissues to infection. Provided the selection of the site has been carefully made, the value of an opening to relieve the tension and to give the tissues a greater chance of reacting is very great, and may be extended in certain cases to the true forms of non-suppurative inflammation. All such incisions almost invariably become septic and are dealt with in the usual way. There is the occasional case in which, in spite of every precaution, the infection passes beyond the limb into the general circulation, owing apparently to an entire failure of tissue reaction. It is here that the bacteriologist may save life and limb, though this remark by no means suggests that his services should be neglected in the less severe cases.

The primary object in all cases of acute bone inflammation must be to lay open at once the whole of the infected area in order to relieve tension. In every case the bone cavity must be opened. Often it is difficult to judge to what extent this should be done. If there is subperiosteal pus the extent of the opening into the medullary cavity should correspond with that of the stripping up of the periosteum. In those cases in which the pus is confined to the medullary cavity—the most acute and fortunately more uncommon type of case — a wide opening should be made in the bone. Afterwards the limb must be completely immo-

bilized by means of a Thomas splint and cross-strapping, the strapping being arranged so that the dressings may be carried out with the minimum disturbance and pain, and the whole limb being suspended from an overhead frame. In these cases intermittent or continuous irrigation is valuable, chiefly because thereby painful dressings can be avoided. If the immediate dangers are successfully overcome the subsequent prolonged and unavoidable sepsis is a big strain on the patient. To avoid this strain some have advocated an immediate subperiosteal resection of the infected area of the diaphysis with almost complete closure of the wound, followed by the application of extension to the limb in order to maintain its length until the new bone has formed.

While it is not possible to correlate in one short paragraph the pros and cons of treatment in joint suppuration, a short reference is necessary because, at first sight, it appears as if the principle of immobilization requires modification. The essential function of a joint is to move, and this fact must never be lost sight of. Hence treatment must satisfy two apparently opposed demands, immobilization of the joint and preservation of this essential function of movement. A joint is immobilized not so much by keeping the limb at rest as by a separation of its articular surfaces; if it is possible to maintain this, there is no reason why early active movements of the infected joint may not be carried out with a view to hindering the formation of adhesions in and around the joint. Extension, then, is our main method of immobilizing a joint, and this should be powerful and continuous until the active suppuration has passed. When considering the means of relieving tension in a joint, we must bear in mind the possibility of an attempt on the part of the synovial membrane to localize the infection. If any such attempt has taken place its object is defeated by extensive opening of the joint cavity. Therefore, provided true immobilization of the joint be maintained, it is better to rely on aspiration, or, if there is no immediate urgency to deal with fluid or collections of pus, by aspiration or incision as occasion arises. In those cases of generalized suppuration of a joint an incision should be made of sufficient extent to allow free evacuation of the pus and the wound should be closed at once. Further accumulations should, as far as possible, be dealt with by aspiration.

There is no essential difference between the treatment of acute suppuration in the peritoneal cavity and elsewhere in the body. The same principles hold good, but perhaps are more difficult in their application. While it is a comparatively easy matter to relieve tension in the abdomen, it is a more difficult thing to maintain the relief. At the same time the defensive mechanism of the abdomen against inflammation and its power of localizing it is more highly developed than anywhere else in the body. The omentum and peritoneum are wonderfully efficient in the way they attempt to shut off an inflammatory process, and one of our main objects must be to interfere with their work as little as possible. In children this resistance is markedly less than in the adult. The main treatment in any case of abdominal suppuration consists in opening the abdominal cavity. If the diagnosis is uncertain a median or paramedian incision is to be made, but, if there is reasonable certainty in the diagnosis, the incision should be placed directly over the primary source of infection. If an acutely inflamed appendix is palpable, the incision should be immediately over it, otherwise over its usual site in the right iliac fossa, but not toward the midline, where the barrier immediately surrounding the inflamed area must necessarily be interfered with.

Immobilization of the abdomen in the strict sense of the word is not possible. Nevertheless, a very great natural effort in this direction is brought into play as soon as any inflammatory process commences in the peritoneum by the arrest of the movements of the abdominal wall and the intestines. This arrest gives the omentum and peritoneum their chance of localizing the

inflammation and of building their barriers against its spread. The staying of the intestinal movements, although at first physiological and helpful, gradually becomes in the generalized peritonitis the fatal factor by reason of an increasing paralysis and consequent obstruction. In the later stages, also, the muscles of the abdominal wall become paralyzed and flaccid. If this stage has been reached before operation the outlook is almost hopeless. The toxemia has been too prolonged or too powerful. In the earlier stages, however, until tension is relieved the abdominal muscles are kept still and in spasm, and in this condition an incision will more or less maintain the immobility, while the spasm will cease with the relief of tension. Abdominal rigidity implies tension.

As little as possible should the condition of rest of the intestines be disturbed. Drastic purgation, if successful, produces violent movement, while it may induce a paralytic condition through too heavy demands on an already tired mechanism. With tension relieved the intestines will try to carry on their normal functions again, but as a general rule they require some assistance in this. Whether pituitary extract has a direct "tonic" action on the intestinal muscle is a question, but its value in the acute abdominal conditions alone, or with the aid of enemata, is very great. In the case of peritoneal suppuration, with much distention of the intestines, injections of pituitary extract given two-hourly from the time the patient is returned to bed, followed by an enema after three or four injections, is a most valuable line of treatment. If the first enema produces no result, the injections are continued and enemata repeated. This method does not produce violent peristalsis or purgation and it saves the patient much discomfort. Further, it seems to diminish the flatulent distention very markedly, and it is uncommon for patients to complain seriously when thus treated. Flatulence, besides causing much distress and pain, is a danger, as the distention and turmoil of the intestine disturbs the condition of rest; its presence indicates probably some degree of paresis of the gut, and its persistence is liable to increase this.

The same principles of treatment already laid down apply in cases of suppuration in the chest, and their application requires modification only to meet the particular circumstances. In no situation, perhaps, is it so simple to produce and maintain a relief of tension, but in its maintenance the very definite and serious complication of superinfection has to be met. It has been the aim of treatment of recent years to avoid this. If it is possible to give unremitting attention, an empyema can be treated by aspiration alone. After the initial aspiration the local and general conditions will immediately improve, and in the exceptional case this improvement will continue without further aspiration being required. As a rule, however, two or more aspirations are necessary, and these should be done as soon as the signs point to a further collection of pus. For routine treatment this method is necessarily somewhat difficult besides being rather uncertain, but in bilateral empyemeta it is of great value. The method of opening and completely emptying the abscess cavity is not only quicker and more certain but also safer, provided that in a case presenting grave constitutional symptoms a preliminary relief of tension by aspiration renders the condition suitable for an operative procedure. After emptying the cavity of pus the question of completely closing the chest wall again must be decided on the merits of each individual case. If, however, signs of further suppuration and rise of tension supervene, aspiration is performed or the incision reopened.

The generally accepted method, therefore, of opening an empyema by resection of a portion of a rib and maintaining the opening by the insertion of a tube is probably the simplest, provided that in all cases the opening is made at the lowest limit of the abscess cavity. The tube, however, here as elsewhere, provides a very sure path for the entrance of fresh organisms.

Consequently, if this method is employed, every precaution must be taken to prevent superinfection. This purpose is best attained, first, by using a long tube, whose free end is carried into a vessel containing some antiseptic; secondly, by fixing a Carrel tube around the tube entering the chest wall (Dean). With this arrangement the long tube may be removed after forty-eight hours, intermittent irrigation of the wound being continued till healing has commenced.

Operation for Femoral Hernia with a Suprapubic Incision.

SAVINI *(New York Medical Journal,* Oct. 19, 1921) observes that the sac of femoral hernia can be divided into three distinct portions: the infundibulum, the neck of the sac, and the fundus. The infundibulum is intra-abdominal and occupies the space between the peritoneum and the femoral orifice; the neck corresponds to the femoral orifice; and the fundus, or sac proper, occupies the triangle of Scarpa and in large hernias is almost subcutaneous.

The operation of femoral hernia consists of four different stages: (1) Isolation and incision of the sac. (2) Inspection, reduction or resection of the contents of the sac according to special conditions and circumstances. (3) Ligation or suture of the empty sac and its excision. (4) Closure of the musculoaponeurotic opening of hernia.

If we analyze these different steps we find that the object of the first and second steps is to repair the imminent danger of the presence of hernia, and the scope of the third and fourth steps is the prevention of future recurrence. There is no question as to the absolute importance of the first two steps of the operation. The sac must always be well opened and the contents of same attended to; but if we give our attention to the relative value attached to the remaining two steps we find that there is, among surgeons, a difference of opinion as to which of the two is the most important to prevent recurrence.

Many surgeons seem to think that a radical cure of femoral hernia is more assured by a complete closure of the femoral ring and canal, while others are of the opinion that a complete excision of the sac and its infundibulum is a better protection against recurrence than the closure of the femoral ring; but, as we have seen that the only way to reach the infundibulum is to perform the operation in the internal or abdominal surface of the abdominal wall, we can group all the different methods advocated for femoral hernia into two classes, the essential difference between the two classes being whether the operation is extra-abdominal and performed on the external surface of the femoral ring, or whether it is intra-abdominal and performed on the internal surface of the femoral ring. To the first group belong all operations done through the femoral route, and to the second group the operation of Ruggi.

Any operation done extra-abdominally with the femoral incision is not generally satisfactory; the femoral sac ordinarily is small, the walls of the sac are thickened, and these two circumstances render it very difficult to open the sac. It is also difficult to reduce the contents of the sac, which cannot be completely excised with certainty. The closure of the femoral ring and the femoral canal is not easy, and not one of the numerous methods described by many authors is satisfactory or generally accepted.

It was to obviate all these inconveniences that Ruggi of Bologna, in the year 1893, advised the inguinal method as the one of choice for femoral hernia. The originality and the ingenuity of the operation of Ruggi consist mainly in the fact that he was the first to recognize the necessity to operate intra-abdominally or on the internal surface of the femoral ring, and he was so convinced of this necessity that he thought it of little consequence to incise through the inguinal canal to reach the hernial sac. Perhaps the sacrifice of the inguinal canal was the reason that his operation was not sooner accepted by the great

majority of surgeons, although it is by far more rational, more anatomically correct, and the most secure of all the operations for femoral hernia.

Ruggi has described two methods for his operation. One way is to dissect and open the hernial sac before opening the inguinal canal. In the second way the inguinal canal is opened first as for operation on inguinal hernia, the cord is displaced, the fascia transversalis incised, and the internal surface of the femoral ring exposed. The sac is then extracted from the femoral canal and opened. After the reduction of its contents, the sac is ligated or sutured at the level of the peritoneum and excised. A few stitches unite the Poupart and Cooper ligaments, and finally the inguinal canal is closed as in Bassini's operation.

In this operation it is not only possible to open the sac with great facility, but the closure of the femoral ring is done with greater security, as Cooper's ligament is better exposed in this than in the femoral operation. It has been said that the inguinal operation has few followers, but that these few are all convinced and enthusiastic.

The greatest objection to the inguinal method is that it requires incision of the inguinal canal which may leave a predisposition to inguinal hernia. Savini reaches the internal surface of the femoral ring with a suprapubic incision leaving the inguinal canal untouched. The abdomen is opened in the midline above the pubis with a vertical incision. The two recti muscles are separated and the rectus of the side of the hernia is retracted with a strong retractor. The peritoneum is separated from the abdominal walls and the femoral ring is exposed. This exposure is easy because the ring is very near to the insertion of the rectus. The sac is separated from the femoral ring with blunt dissection and is pulled out intact from the femoral canal with the aid of a small sponge-holder.

This part of the operation requires some patience, and it may be necessary to make an incision on the Gimbernat ligament to extract a large sac. But, when the sac is extracted from the femoral canal, all the remaining steps of the operation are made with great facility. The sac has now the appearance of a diverticulum of the peritoneum and can easily be opened and, when empty of its contents, can be ligated and excised at the level of the peritoneum. Two or three stitches will now bring the Poupart ligament nearer to the Cooper ligament to reduce the diameter of the orifice.

In this modification the operation is practically identical with the operation of Ruggi, the only difference being that the inguinal canal is not opened. Savini first used this method in 1915 upon a woman affected with double femoral hernia, when he tried to do both operations with a single incision. With this method he also operated upon a man affected with double femoral hernia and chronic appendicitis, and the three operations were performed with one incision only. This same method was used by Savini in operating upon two men upon whom he had operated years before with the ordinary method for femoral hernia, and in both there had been a recurrence. These operations done with the suprapubic incision were successful, and up to the present time there has been no recurrence.

Treatment of Syphilis by Intravenous Injection of Mercury.

LANE (*Lancet*, Oct. 15, 1921) refers to a few previous communications of his on the subject and to his observation that the effects resulting from this method of mercury administration were more rapid than those produced by intramuscular injections; that no pain was caused and that the injections were perfectly safe. The only drawback to the method was the difficulty of always hitting a vein. The preparation he originally employed was a solution of cyanide of mercury; the dose was 20 minims, at first given on alternate days, but later more frequently; the number of injections varied from 46 downward, but in at least 10 cases the treatment had to be discontinued, owing to the difficulties of finding a suitable vein, or at the patient's own request.

In 1897 he stopped this treatment for some years, but in 1917 resumed it and states that he has given it to 166 patients, of whom 40 were pregnant, mostly in the early stages. The routine treatment was one injection of one of the salvarsan substitutes and five of the cyanide solution per week; the doses of the latter varied with the tolerance of the patient, and it was found that many patients could stand a dosage of 40 to 50 minims, so that they received 200 to 250 minims in the course of a week. The maximum number of cyanide injections given was 110. In two cases phlebitis and occlusion of the veins occurred. In 40 pregnant cases the Wassermann was positive in 37 on admission and negative in 3. Of the babies born of these women 36 gave negative Wassermann reactions at birth and remained negative until they and their mothers were discharged from the hospital free from symptoms. Two cases of macerated fetus occurred at about seven months.

Thibierge, of the St. Louis Hospital, in 1918 stated that intravenous injections of cyanide of mercury are superior to all other forms of treatment, and that they constitute an attacking treatment for which no "mercurial preparation suited for the treatment of syphilis in soldiers can be substituted."

Carcinoma of the Rectum.

PFEIFFER *(Pennsylvania Medical Journal,* October, 1921) notes in a consideration of carcinoma of the rectum certain outstanding facts.

Carcinoma of the rectum is a common disease ranging next in frequency to carcinoma of the stomach.

The mortality of cancer of the rectum unoperated is the same as that of cancer of the stomach, namely, 100 per cent.

Yet strenuous efforts are made to diagnosticate and operate early upon cancer of the stomach, while general apathy exists concerning the recognition and early operation upon cancer of the rectum, and in some quarters skepticism and even opposition to the radical operation still obtain.

This is the more remarkable because the possibilities of cure of cancer of the stomach by operation are much inferior to the chances of permanent cure in cancer of the rectum when operated upon in the same stage.

This is due to the known fact that as a class, cancer of the rectum grows more slowly, metastasizes less rapidly, and is susceptible to wider excision than gastric cancer.

The apparent paradox is explainable chiefly by three conditions:

At the present time, on the average more than a year has elapsed between the onset of symptoms and recourse to surgical relief.

The dread of an artificial anus, which is at times the price the patient must pay for the chance of surgical cure, deters both physician and patient from seeking operation until driven by the extremity of suffering or fear of impending death.

The further fact, which we as surgeons must acknowledge, that there is as yet no general agreement as to the operative method or methods which are at once least dangerous primarily and most promising of ultimate cure.

The fact is that the diagnosis is only to be made, but usually easily, by examination. The finger is the best instrument, and a rubber glove or finger-cot the only armamentarium. Fully 90 per cent of rectal cancers are readily palpable with the finger, while those of the rectosigmoid which are not palpable give early signs of obstruction. Two-thirds of the cases occur within the two decades from forty to sixty years of age, but the extremes of life are not immune. The oldest case in this series was 76 and the youngest 16. The latter gave a history of removal of some kind of a rectal growth at the age of two years, and the condition when seen at the age of 16 was apparently a recurrence, having given symptoms for two years and was extensive and inoperable. Diagnostic pitfalls are the liability to consider the bowel irregularities of

the early stages as functional disturbances and the bleeding as due to hemorrhoids. The sole hope and starting-point of effective measures against this condition is examination.

In considering the operative treatment of cancer of the rectum we find the most extraordinary number of varied methods and procedures. The situation reminds one of the wealth of advice to be had on the treatment of a medical condition for which there is no satisfactory treatment. It is axiomatic in surgery that low mortality and satisfactory results are to be achieved only by standardization of methods along rational lines. Accordingly we are not surprised that the mortality of surgeons operating casually upon such cases as they may chance to encounter is appalling, certainly more than 25 per cent, and often much higher. On the other hand clinics and individuals that have cultivated this field and achieved considerable standardization and experience can show very low mortalities, as, for example, Crile, who reports no fatalities in his last 20 excisions of the rectum, and Lockhart-Mummery, who has an equally good record in his last 24 cases.

Pfeiffer believes that one principle can now be enunciated as a prerequisite to low mortality, namely: the preliminary colostomy, which entails a two- and possibly three-stage operation. This rule may not be violated on caprice, but only on rare and unusual grounds. In palliative operations and in limited local excisions if thought advisable the preliminary colostomy may be omitted without marked effect upon primary mortality, but when the complete operation is made with its enormous denudations and opportunity for infection it is only by the preliminary colostomy that the requisite strict asepsis can be consistently maintained. Abdominal exploration should be made at this stage, and the colostomy made of a temporary or permanent type in accordance with the decision then reached as to the next stage. In any event a spur must be formed that will divert the entire fecal stream. Pfeiffer's preference is for a lumbar or a high and lateral inguinal colostomy as being less in the way of a second laparotomy and less objectionable to the patient than an opening more centrally situated.

It would seem to be an improvement to suture the two limbs of bowel together if the colostomy is to be only temporary, as by this means the spur can be cut away in the manner of the third stage of Mikulicz, which permits either spontaneous closure or an easier and safer plastic. The sacral anus is to be condemned as more filthy and difficult of control. The abdominal anus is also to be preferred if there is great probability that a functionating anus in the normal position cannot be maintained.

What should be our attitude toward the abdominal part of the complete operation? In well-developed cancer of the upper half it is practically obligatory unless general contraindications such as age, debility, and obesity exist. In cancer of the lower half, especially if early and no lymphatic enlargement demonstrable by exploration at the first stage, we believe that the greater mortality of the abdominoperineal operation justifies contentment with the complete excision from below by some such radical removal as that recommended by Lockhart-Mummery. The excision of dangerous tissues as far up as the promontory of the sacrum may be made almost as complete from below as when the abdomen is opened. The mortality is certainly much less, and it is doubtful if the ultimate result in cancer which has spread above the promontory of the sacrum would be much improved by an intra-abdominal dissection.

Contracted Bladder.

FRONTZ *(Journal of Urology,* Volume V, No. 6, 1921) thus summarizes an excellent article, based on a large clinical experience:

The essential lesion in the condition variously described as "elusive ulcer," "localized cystitis," "interstitial cystitis," "panmural cystitis," etc., is a submucous fibrosis. In most cases other evidences of

inflammatory changes are noted in the different layers of the bladder wall, but these differ in no respect from the average case of chronic diffuse cystitis.

The cardinal symptoms of the condition are urinary frequency and pain, referred chiefly to the suprapubic region and resulting from overdistention of the bladder.

The diagnosis is based upon the history, the finding of a diminished bladder capacity, with urine not infrequently sterile, the production of intense suprapubic pain when an attempt is made to introduce fluid beyond its capacity, and cystoscopic findings often comparatively slight and out of all proportion to the clinical picture presented. In cases having sterile urine, cystoscopy may reveal insignificant and trivial areas of reddening of the mucosa at one or more points; in other cases slight puckering is noted, while in cases having an infected urine superficial ulceration may be present. The occurrence of bleeding at the site of the lesion, following overdistention, is strongly suggestive of the condition, but the production of linear or irregular tears in the mucosa by this procedure is almost pathognomonic of it. The bladder capacity when the patient is deeply anesthetized approaches normal, a point of differentiation between the cases in which the lesion is more or less localized and those cases in which practically the entire bladder is involved. In the latter group the bladder is inelastic and the capacity under anesthesia shows very little increase over that when the patient is awake.

Hydraulic distention of the bladder, local application of various drugs, high frequency, etc., have in our experience been unproductive of permanent results in this group of cases.

When the lesion occupies a portion of the bladder permitting resection, this procedure should be employed. In those cases in which resection is not feasible, deep cauterization should be practiced.

The author further remarks that in the four cases in which treatment consisted solely of hydraulic distention and local applications, there has been marked improvement in urinary frequency and pain. In none of these, however, has the improvement been permanent, and it seems probable that a complete cure will not be realized until more radical measures are instituted.

Blood Transfusion as a Therapeutic Agent in Pediatrics.

SPOHN (*Archives of Pediatrics*, October, 1921) states that a slightly modified Lindeman method is the one in use at the Hospital for Sick Children, Toronto. The instruments used are six 20-cc Luer glass syringes, a vein needle of the trocar-cannula type, several Luer needles with unbeveled tips, two short rubber tubes to connect needles and syringes, a fine pair of scissors, a set of small dissecting instruments, and one or two small artery forceps.

The usual surgical preparation of instruments is observed, and syringes, tubes and needles are lubricated by drawing through them sterilized liquid paraffin.

It is usually necessary to cut down and expose the recipient's vein in infants and children. One of the elbow veins or the internal saphenous is usually selected. After sterilization of the skin, local anesthesia is produced by the injection of 1.5-per-cent novocaine or a 1-per-cent apothesine solution.

A tourniquet is used to distend the vein, and after exposure the vein is tied at the distal end and the tourniquet is released. A small oblique opening is made in the vein with the scissors and an unbeveled needle introduced and tied into the vein. As soon as the needle fills with blood a syringe filled with saline is attached and a small amount of saline slowly introduced to clear the needle of blood. As soon as the assistant has secured a 20-cc syringeful of the donor's blood, the saline syringe is disconnected from the needle and the donor's blood is injected into the recipient's vein. A small amount of saline solution is injected as soon as the blood has been given in

order to keep the tube and needle free, and another syringe of blood is then injected; the operation being repeated until the required amount of blood has been given. From twenty to thirty seconds is the usual time taken to introduce 20 cc of blood; 100 cc in three minutes is the rate of injection. A free supply of blood from the donor is assured by clearing the needle in the vein from time to time with saline.

The amount of blood transfused is important, and an estimate of the blood volume of the patient should be considered. In this regard Lucas and Dearing have just published an article showing that the blood volume in infants varies considerably, but placing the average at 14.7 per cent of body weight—147 cc per kilogramme. The amount to be given varies according to the condition for which it is given, the result to be achieved, and the physical condition of the patient. Unger, in 1919, advised as the usual dose for infants 80 to 150 cc. A safe limit is to give up to 15 cc per pound of body weight. In mild cases of hemorrhage a much smaller dose will often be sufficient. Experimentally, an animal cannot always survive a loss of half its blood volume, so that it may be assumed that an exsanguinated infant has lost from one-fourth to one-half its blood volume.

The symptoms of isohemolytic reactions occur while the transfusion is in progress or directly after it. The patient becomes restless, there is increased respiration and pulse, at times cyanosis, and adult patients complain of severe pain in the lumbar region; nausea and vomiting may occur. There is a sharp rise of temperature to 104° or more, and this is usually followed by a severe chill. The patient appears shocked and may become unconscious—later hemoglobinuria with suppression of urine follows, and later on jaundice. The severity of the reaction is usually over in twenty-four hours, and of course at many times reactions are much milder than those described; at times they are delayed in their onset, sometimes not appearing for eighteen hours. Recovery is more general than fatal termination.

Transfusion exerts influences in different ways: (1) it replenishes a depleted circulation (unlike saline injections it maintains an increased blood volume) by producing an increased blood volume with a decreased rate of blood-flow, and there follows a diminution of the rate of pulse, respiration, and a rise in blood-pressure; (2) it replaces lost corpuscles—that is, it replaces tissue (Ashby in her work has shown that 80 to 60 per cent of the transfused corpuscles may remain in the circulation for 26 to 35 days); (3) it stimulates blood production—that is, it increases marrow activity; (4) it tends to reduce fever in cases in which this has been present previous to transfusion; (5) if basal metabolism has been high it tends to diminish it; (6) it promotes general improvement of health, as seen in increase of appetite, relief of restlessness, decrease in headaches, etc. The blood picture after transfusion often depends on the form of the disease present. There is a general tendency to make the blood-forming tissues act in a normal fashion, therefore if benefit is received there is a more or less marked tendency for the blood picture to become more normal. There is usually an increase in hemoglobin percentage (up to 15 per cent) and usually an increase in the red count.

He considers transfusion indicated in hemorrhage, hemophilia, purpura hemorrhagica, pernicious anemia, secondary anemia, leukemia, pseudoleukemia, shock, and chronic sepsis. He concludes his paper as follows:

Infants under six months cannot be definitely grouped, but even at this age incompatibility occasionally exists and the blood of the donor and recipient should be tested against each other or grouped.

The normal blood volume should be considered and hypertransfusion should be avoided.

The direct method is safe and quick and produces fewer reactions than the citrated method.

For simple hemorrhage the citrated method is usually sufficient.

For hemolytic conditions in infants and children the unaltered whole blood is more beneficial.

Transfusion is of definite value in the relief of hemorrhage and certain hemolytic conditions. Its value as a proven therapeutic agent in infections and nutritional disorders has yet to be established.

Reviews

PSYCHOANALYSIS: ITS THEORY AND PRACTICAL APPLICATION. By A. A. Brill, Ph.B., M.D. Third edition. Philadelphia and London, W. B. Saunders Company, 1922.

The reviewer has not for some years past concerned himself with the puerilities of Freudism. The term "psychoanalysis," the "analysis of the mind," the "analysis of the soul," is certainly high sounding, and for some seems to have a special attraction. The reviewer has many times in the past expressed himself on this subject, and has especially pointed out two cardinal facts: First, that the Freudians ignore as unworthy of attention the evident and grossly patent fact of the biological inferiority of the neurotics and the insane as a class; secondly, that upon this already morbid soil they graft by their "technique," *i.e.*, by their suggestions, their own ideas of "repressed sexual complexes," "sexual traumata," the "libido," the "Œdipus complex," the incestuous longings, homosexuality, perversions, and bestialities. They ignore the fact that just as the body may reveal the evidences of arrest and deviation of development, so may the mind. That such arrests run parallel with arrests of the brain is shown by our studies of the brains of idiots and feeble-minded children, and when we deal with patients suffering from the neuroses and mental affections generally, we are dealing with individuals of whom it is equally true that they are organically defective. This is the essence of what is meant by "neuropathic" and "neurotic." The neuroses reveal not only in the history of heredity, but also frequently present upon the very person of the patient, the physical evidences of an imperfect and deviate development. Mentally, likewise, the neuroses present deficiencies and deviations which give to each its basic symptomatology, and which in each are innate and developmental. One could with equal reason attempt to cure a harelip or a cleft palate by talking at it, or to cause a cervical rib or a supernumerary digit to disappear by the same means, as to attempt to cure, for instance, a case of dementia præcox by psychoanalysis. It certainly does not seem philosophical to talk of such a treatment for a patient with the earmarks of a defective development, a positive Wassermann, a toxic metabolism, defensive ferments, and other basic abnormalities by "psychoanalyzing" the patient.

Freud and his disciple Brill attempt to evade the absurdity of the psychoanalytic position by stating that psychoanalysis has a limited field and that it should only be used in limited cases. According to the quotation made by Brill in his preface, Freud states that "if one wishes to take a safe course, he should limit his selection to persons of a normal state." In other words, the treatment should be limited to those in whom there is nothing the matter!

In one of his earlier papers on the subject, the reviewer called attention to the sexual relation which must inevitably be established between the psychoanalyst and his patient. This fact of a sexual relationship is well recognized by psychoanalysts themselves; they term it "rapport" or "transference"; indeed Brill states that nothing can be done without this transference, and unless it is properly managed little can be done for the patient. "There

must be a mutual understanding and liking between doctor and patient. One must, however, be on his guard lest the transference be carried too far. One must remember that one is dealing with people whose libido is striving for fixation, and care and tact therefore must be exercised to remain good friends only." To the reviewer it seems that comment upon this "transference" or "rapport" is unnecessary.

The present volume adds nothing new to the subject of psychoanalysis. Stress is again laid upon Freud's idea of sexuality—*i. e.,* upon the love life of the individual. "As soon as we enter into the intimate life of the patient, we are sure to find sex in some form; indeed, the surest indication of an abnormal sexual life is an apparent absence of the sexual factors. It is naturally advisable to be very careful in approaching the subject so as not to shock the patient. Moreover, psychoanalysis presupposes a knowledge of not only Freud's theories of sex, but also a broad knowledge of psychosexuality in general." The theories presented in the book are those with which the world is already familiar and deal with the general subject of the repression of the sexual complexes, with their compensations, substitutions, sublimations, and so forth.

As before, too, there is the frank admission that psychoanalysis requires a large amount of time. Says Brill: "Indeed, psychoanalysis takes time. The treatment of a chronic case usually takes from six months to a few years, but the most refractory chronic cases have been cured by this treatment." To the practical neurologists of America, familiar with the physical condition of the psychopathic and neurotic patients, and familiar with the results of simple physiological methods, rest, full feeding, etc., and the opportunity which these methods present for mental retraining and suggestion, both direct and indirect, will shrug their shoulders when they think of the very limited time required to treat successfully cases of the neuroses by these methods, even when the patients are merely in the general nervous wards of hospitals. A few weeks, at most three months, not six months or three years, are required.

In Brill's book one looks in vain for a physiological interpretation: for instance, of neurasthenia as due to chronic fatigue. The expression "fatigue neurosis" nowhere occurs, while Janet's great services in hysteria receive practically no consideration. However, this is quite in accord with the usual attitude of psychoanalysts, even with the admitted fact that Janet was the first to point out that we like to suppress memories of things that are painful or of which we may be ashamed.

This much, however, is to be said for the book before us, and that is that it is lucid, clear, and well written, which is much more than can be said of the writings of the leader of the cult. The volume is attractively and beautifully printed and is a fine specimen of the medical publisher's art. To those who wish to have a knowledge of psychoanalysis, the reviewer would suggest that they read the book, but also that they at the same time read the brilliant and exhaustive discussion of the subject by Dr. Charles K. Mills *(Archives of Neurology and Psychiatry,* December, 1921, p. 595), and also the irrefutable presentation by Knight Dunlap in his book on "Mysticism, Freudianism and Scientific Psychology."

In conclusion, a final fact must again be pointed out, and one to which Hoche in his admirable paper years ago directed attention *(Archiv f. Psychiatrie,* 1913, li, No. 3)—*i. e.,* of the insidious, pernicious and evil effects of the method. Hoche laid great stress upon the harm that may be done. In conclusion it may be said that after all surface symptoms alone can be played upon; the underlying basic condition can never be in the slightest degree influenced. And, as regards the claims of cure in the slighter nervous disorders—*i. e.,* those in which there is "really nothing the matter after all"—Freudianism stands on the same footing as Eddyism and like forms of mental healing. Like the latter it is mystic medicine.

F. X. D.

DISEASES OF THE EYE. A Handbook on Ophthalmological Practice for Students and Practitioners. By George E. de Schweinitz, M.D., LL.D. Ninth edition, illustrated. W. B. Saunders Company, Philadelphia, 1921. Price $10.

As has been well said in a review of this book in a recent issue of the London *Lancet*, it occupies the position of a classical contribution to ophthalmology. Although it is thirty years since the first edition appeared, the author from time to time has had an opportunity to make many changes when the book has been revised, and on this, the ninth, occasion he has had an opportunity to more thoroughly revise the text because it was found necessary to have it entirely reset. Therefore the book has been recopyrighted.

It is quite impossible in the space which is at our disposal to mention all of the subjects which are now included for the first time in the text. Many of them, it is true, deal with conditions not commonly met with, but others deal with matters which are of daily interest to the active ophthalmologist. More frequently than in previous editions foot-note references to important publications have been inserted and a number of new illustrations have been added.

As in former editions the author has called to his assistance Lieutenant-Colonel Elliot for the description of Corneo-scleral Trephining; Dr. William M. Sweet, for an account of his method of Localizing Foreign Bodies in the Eyeball by means of the X-rays; Dr. Edward Jackson, for the section devoted to Skiascopy, or the Shadow-Test; and Dr. Alexander Duane, for certain excellent suggestions which have been incorporated in the chapter on the Movements of the Eyeball and their Anomalies.

Altogether the book contains 450 illustrations and 7 colored plates designed especially for the ophthalmologist or for the student who expects to devote himself to this specialty in medicine. The volume without doubt is one which will prove most useful to the general practitioner who has occasion to carry on those parts of ophthalmology which are closely allied to general practice. The index is unusually complete, and heavy-faced type is often used to indicate those items which are of particular importance.

Among the reasons that the book is so successful may be mentioned the fact that the author has had an exceedingly large experience in private and hospital practice and as a teacher, and also an equally large experience as a medical officer during the Great War on both sides of the Atlantic. Last of all he has the pen of a ready writer, and the text is therefore clear, succinct, and easy of comprehension.

PROGRESSIVE MEDICINE. A Quarterly Digest of Advances, Discoveries and Improvements in the Medical and Surgical Sciences. Edited by H. A. Hare, M.D., LL.D., assisted by Leighton F. Appleman, M.D. Volume I, March, 1922.

The present issue of Progressive Medicine contains articles upon a number of important practical subjects. A careful story of the progress of the Surgery of the Head, Neck, and Breast, gleaned from the literature of the past twelve months, has been prepared by Dr. Charles H. Frazier, Professor of Clinical Surgery in the University of Pennsylvania, while that upon the Surgery of the Thorax, which includes Diseases of the Breast, has been written by Dr. George P. Müller, surgeon to several Philadelphia hospitals. These two articles are followed by one upon The Infectious Diseases by Dr. John Ruhräh, Professor of Diseases of Children, University of Maryland. Another sums up the literature for the past year upon Diseases of Children by Dr. Stafford McLean, who is Assistant Attending Physician to the Babies' Hospital in New York; and last of all, Dr. George M. Coates, Professor of Otology in the Graduate School of the University of Pennsylvania, contributes the article upon Rhinology, Laryngology, and Otology.

Illustrations are used wherever it is necessary to make the text clear, notably in the article by Dr. Frazier, whereby the surgeon is clearly informed as to the incisions which should be made.

To those who are interested in disease of the nose and throat, the summarization of the valuable researches of Schaeffer upon vascular anomalies in connection with nasopharyngeal conditions will prove of great interest.

The names of the collaborators are sufficient guarantee of the quality of their work.

The volume is well printed with heavy leading and is easily read.

AN INTRODUCTION TO DERMATOLOGY. By Norman Walker, A.M., M.D., F.R.C.P. Seventh edition. William Wood & Company, New York, 1922. **Price $7.**

Dr. Walker is physician for Diseases of the Skin of the Royal Infirmary of Edinburgh, and published the first edition of his book in 1899, twenty-three years ago. In the present edition he tells us that he has resisted a temptation to enlarge its scope, evidently because he wishes it to be a useful manual for the practitioner rather than an exhaustive scientific treatise for the skilled dermatologist. He exercises a very conservative judgment in regard to some of the newer methods which have been introduced, although he tells us that he is not hostile to them, believing that we are on the verge of great advances in this branch of medicine.

The article on pellagra has been carefully revised; much has been added upon hypersensitiveness of the skin, and some of the colored plates are also new.

The book contains 356 pages, and therefore is more brief than some of the more elaborate contributions to the literature on this subject. The colored plates are well executed, as, for example, those showing dermatitis venenata, iodide rash, and impetigo contagiosa. Others equally good might be named. There is also an excellent colored plate of arsenic keratosis. Indeed, the chapter upon irritation of the skin induced by drugs is unusually thorough, which is an important point for the general practitioner, who is often misled by these drug rashes into an erroneous diagnosis. For the general practitioner who sees a considerable amount of skin disease we believe that this is possibly the best book which he can purchase, as its price is moderate, it is not unduly exhaustive, and yet it is sufficiently complete to meet all his needs.

MEDICAL CLINICS OF NORTH AMERICA. For January, 1922. W. B. Saunders Company, Philadelphia, 1922.

This so-called New York number of course contains clinics of New York hospitals. They are by Harlow Brooks, Mosenthal, Boas, and nine others, and the subjects vary from Staphylococcus Aureus Endocarditis to Tabetic Crises and Associated Gastric Ulcer. Dr. Brooks deals with Pneumonia, Dr. Mosenthal with the Treatment of High Blood Pressure, and Dr. Boas with the Rôle of the Capillaries in Circulatory Disorders. As in earlier editions large type is used and wide spacing, so that the text is easily read.

A PRIMER FOR DIABETIC PATIENTS. By Russell M. Wilder, Ph.D., M.D., Mary A. Foley, and Daisy Ellithorpe. W. B. Saunders Company, Philadelphia, 1921. Price $1.50.

As its name indicates this little volume of 76 pages, including the index, is designed to be a brief outline of the principles of diabetic treatment, and it gives sample menus, recipes, and food tables. The female contributors are dieticians in the Mayo Clinic. The title-page is faced by a colored plate showing various reactions with the Benedict test for sugar. As a handy source of recipes and methods it will prove useful to the busy practitioner who sees cases of diabetes only occasionally. The authors, however, belong to that school which believes that much of the care of the patient should rest with himself, even to frequent examinations of his urine. They admit that an occasional nervous person is hard hit by such procedure, but believe that those who are benefited vastly outnumber those who are harmed. We confess that in our experience, if the average diabetic

is taught to examine his own urine, he is prone to become a diabetic crank and to be so nervous concerning the results of each examination that they often make him worse. How wise it is to put in the hands of patients a book which in the brief space of less than half a page describes the treatment of impending diabetic coma is we think questionable. After all we presume that this little manual is really intended for patients of the Mayo Clinic rather than for those in charge of other practitioners, since on page 25 patients are urged to write after they leave the hospital and to reply promptly to questionnaires which will be sent to them at intervals, such correspondence to be addressed to the Diabetic Service, Mayo Clinic, Rochester, Minn.

AN ESSAY ON THE PHYSIOLOGY OF MIND. By Francis X. Dercum, M.D., Ph.D. W. B. Saunders Company, Philadelphia, 1922. Price $1.75.

This essay, which is reverentially inscribed to the memory of one of his former masters, Joseph Leidy, by the author, endeavors to present the basic facts of those reactions of the organism to the environment which under given conditions manifest the qualities which we speak of as "mind."

The discussion of his text leads the author to a consideration of elementary responses to impacts and then to the recondite problems of consciousness.

The book is evidently intended as much for the lay reader as for the medical man, for the author states in his preface that as far as practicable the language employed has been as simple as the nature of the subject permits. We feel that notwithstanding this endeavor, the subject is too deep for understanding by the average layman, and possibly some medical men will also find it difficult to grasp the full meaning of the author's text.

That this essay is a scholarly effort to discuss clearly a difficult subject will be recognized by every one who reads its pages, and no one who does scan these pages can fail to be impressed by the fact that in the preparation of this small handbook, or brochure, the author has not only brought before us the results of an enormous amount of study of scientific literature, but also the results of many years of thoughtful consideration of his theme.

AN INDEX OF TREATMENT. By Various Authors. Edited by Robert Hutchison, M.D., F.R.C.P., and James Sherren, C.B.E., F.R.C.S. With revision to conform with American Usage by Warren Coleman, M.D. Eighth edition, revised and enlarged. William Wood & Company, New York, 1921. Price $12.

Each of the previous editions of this excellent Index of Treatment have been noticed in the GAZETTE as they have appeared, the first edition having come out in November, 1907. That it should have reached an eighth edition in the brief space of fourteen years is an indication that the book contains much that has proved useful to practitioners. The Editors tell us in their preface to the present edition that they have endeavored to revise the book so as to bring it as far as possible abreast of the latest knowledge, and this has led them to give special attention to such subjects as burns, diabetes, electrotherapeutics, hysteria, mental diseases, neurasthenia, and rabies. New articles have been inserted dealing with encephalitis, kala-azar, snakebite, transfusion, and the surgical treatment of constipation.

Those who possess earlier editions will remember that the text is arranged in alphabetical order, beginning with abdominal injuries. There is a brief introduction on some general principles of therapeutics by Dr. Hutchison.

No less than 88 illustrations are found in the volume of 1029 pages, including the index. Unlike many works of this character, the number of contributors is very great, numbering considerably over 100. Many of them have an international reputation, as, for example, Sir Clifford Allbutt, Sir John Rose Bradford, Byrom Bramwell, Sir Robert Jones, Lockhart-Mummery, and others of equal eminence. We do not see how more valuable information could be provided for $12 than this volume contains.

ABDOMINAL PAIN. By Professor Norbert Ortner. Authorized translation by William A. Bramm, M.D., and Alfred P. Luger, M.D. The Rebman Company, New York, 1922.

In the space of 342 pages the author of this practical clinical book divides his subject in a very natural way: first discussing diffuse abdominal pain, and then the pains which are found in various zones of the abdomen, as in the epigastrium, the right hypochondrium, the right and left lower quadrant, and then the more localized areas, as, for example, in the region of the navel and the hypogastrium.

He concludes the book with an appendix in which he discusses radiating abdominal pain, the relation of abdominal pain to the intake of food, abdominal pain during defecation, and that associated with bodily emotion, and the abdominal pain associated with a sensation of anxiety, with constipation and menstruation.

The text is rather in the nature of an essay than of a text-book, and is, of course, written from the standpoint of symptomatology rather than from that of etiology and treatment. Many practical points may be picked up by the practitioner from a perusal of its pages, which is made the more easy by the large type and heavy leading resorted to by the printer.

Ortner, the author, is chief of the Second Medical Clinic at the University of Vienna.

Correspondence

Value of Correct Diagnosis.

To the Editors of the THERAPEUTIC GAZETTE.

SIRS: A young girl of thirteen years came under my treatment for paralysis of both legs. The onset was gradual for three days before she became completely paralyzed; weakness and a limp in the gait were observed. Going into the history of the case I found she was a recently married girl (marriage occurred two months before the paralysis), with no signs of previous ailment except slight rises of temperature at night for seven days, immediately after her marriage. The fever came down to normal without intake of any drugs. The family history is very sound, mother and father being of normal temperament and always healthy. Physical condition was as follows:

The girl is of moderate size and fair constitution, with all her organs quite normal. The paralysis was more of motor than sensory origin. The reflexes were all normal except the Babinski, which was quite marked in both toes. Examining her spine, nothing could be elicited excepting slight pain on tapping at the lower dorsal and the upper lumbar spines. Great difficulty arose regarding the diagnosis, as it neither seemed like a case of compression paraplegia, for none of the compression symptoms were present, nor like a flaccid paraplegia. The exaggerated knee-jerk and ankle clonus with Babinski reaction made the case suspicious as being one of organic origin, though no organic lesion could be detected anywhere.

Taking the case to be merely functional (though no stigmata of neurosis were present) the patient was put under antihysterical treatment and treated by suggestion. The patient made a marvelous recovery under fifteen days' treatment. The patient, who at first was bedridden, was able to go up and down the stairs by the end of the above-mentioned period. One remarkable incident observed in her was that as she progressed the deep reflexes went on increasing. She is now able to put on her shoes without the aid of her hands (which she could not a few days back) and is moving freely, though there is still a bit of weakness of the legs and feet. A medical practitioner should always bear in mind

that in a case where no cause of such disease is ascertained, the best principle is to treat it on hysterical lines, and one would get a fair response.

The points of interest would seem to be:

1. Presence of Babinski reaction which is said to be negative in hysteria.

2. Absence of any neurotic stigmata in the patient.

3. No history of nervous disturbances in the parents.

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Notes and Queries

"The Doctor."

The following item written by Dr. William Y. Ward, of Ivanhoe, Texas, has been published and recopied in a number of magazines recently. If the reader has not yet seen it, it may hold some interest:

"I am the custodian of health, that condition of mind and body essential to the adequate enjoyment of all life's blessings, of the food supplied by the farmer, the reading matter provided by the editor.

"I am the only servant of society who is expected to adhere to the twenty-four-hour work-day and the seven-day work-week. I am understood to be ready to answer all calls, regardless of hour or weather.

"I am the first to be summoned in serious illness or accident, and the last to be remunerated for my service.

"In war I am able to forestall the appalling loss of men from disease, much more decimating to armies than shot and shell. In peace I am still on military duty, although no politician suggests a bonus or advocates a pension.

"Each day upon the firing line of my profession I have coughed into my face the deadly germs of 'flu,' pneumonia, and tuberculosis.

"I am with you in the hour of nativity; I minister to the ailments of your infancy and childhood; and, when the final battle with death has been lost, I am found at your bedside as you 'put out to sea.'

"I am an insignificant unit in the puny army that is called upon to police the world of disease. Yet I am expected to appear in the sick-room with the smile and the message of gladness and good cheer.

"My competitors are as the sands of the sea. The patient-medicine man has a ready-to-take remedy for each particular ill, with many panaceas besides. The Christian Scientist attacks disease by giving it the cut direct, and by resolutely refusing to recognize its presence. Many of the mind-cure cults accuse me of gross materialism, while the chiropractor cannot understand why I do not 'cure' all forms of disease through the 'adjustment' of a vertebra.

"Notwithstanding all these impediments, when surgery is required, or epidemics are to be controlled, or when grave illness strikes your home, I am usually called.

"You have guessed what I am. Some call me 'doc.'

"I am the doctor."—*Ohio State Medical Journal*, January 1, 1922.

William Withering and His Book on the Foxglove.

Ruhräh, in the *Medical Record* of December 17, 1921, in its columns on Medical History, under "New Books and Old," states that the story of the discovery of the drug, one of the many wonderful stories in the history of medicine, Withering tells as follows:

"In the year 1775 my opinion was asked concerning a family receipt for the cure of the dropsy. I was told that it had long been kept a secret by an old woman in Shropshire, who had sometimes made cures after

the more regular practitioners had failed. I was informed, also, that the effects produced were violent vomiting and purging; for the diuretic effects seemed to have been overlooked. This medicine was composed of twenty or more different herbs; but it was not very difficult for one conversant in these subjects to perceive that the active herb could be no other than the foxglove.

"My worthy predecessor in this place, the very humane and ingenious Dr. Small, had made it a practice to give his advice to the poor during one hour in a day. This practice, which I continued until we had a hospital opened for the reception of the sick poor, gave me an opportunity of putting my ideas into execution in a variety of cases; for the number of poor who thus applied for advice amounted to between two and three thousand annually. I soon found the foxglove to be a powerful diuretic; but then, and for a considerable time afterwards, I gave it in doses very much too large, and urged its continuance too long: for misled by reasoning from the effects of the squill, which generally acts best upon the kidneys when it excites nausea, I wished to produce the same effect by the foxglove. . . . It was from this kind of experience that I ventured to assert, in the Botanical Arrangement published in the course of the following spring, that the Digitalis purpurea 'merited more attention than modern practice bestowed upon it.'

"I had not, however, yet introduced it into the more regular mode of prescription; but a circumstance happened which accelerated that event. My truly valuable and respectable friend, Dr. Ash, informed me that Dr. Cawley, then principal of Brasenose College, Oxford, had been cured of a hydrops pectoris, by an empirical exhibition of the root of the foxglove, after some of the first physicians of the age had declared they could do no more for him. I was now determined to pursue my former ideas more vigorously than before, but was too well aware of the uncertainty which must attend on the exhibition of the root of a biennial plant, and therefore continued to use the leaves. These I had found to vary much as to dose, at different seasons of the year; but I expected, if gathered always in one condition of the plant, viz., when it was in its flowering state, and carefully dried, that the dose might be ascertained as exactly as that of any other medicine; nor have I been disappointed in this expectation. The more I saw of the great powers of this plant, the more it seemed necessary to bring the doses of it to the greatest possible accuracy. I suspected that this degree of accuracy was not reconcilable with the use of a decoction, as it depended not only upon the care of those who had the preparation of it, but it was easy to conceive from the analogy of another plant of the same natural order, the tobacco, that its active properties might be impaired by long boiling. The decoction was therefore discarded, and the infusion substituted in its place. After this I began to use the leaves in powder, but I still very often prescribe the infusion.

"Further experience convinced me that the diuretic effects of this medicine do not at all depend upon its exciting a nausea or vomiting; but, on the contrary, that though the increased secretion of urine will frequently succeed to or exist along with these circumstances, yet they are so far from being friendly or necessary, that I have often known the discharge of urine checked when the doses have been imprudently urged so as to occasion sickness.

"If the medicine purges, it is almost certain to fail in its desired effect; but this having been the case, I have seen it afterward succeed when joined with small doses of opium, so as to restrain its action on the bowels.

"I use it in the ascites, anasarca, and hydrops pectoris; and so far as the removal of the water will contribute to cure the patient, so far may be expected from this medicine; but I wish it not to be tried in ascites of female patients, believing that many of these cases are dropsies of the ovaria; and no sensible man will ever expect to see these encysted fluids removed by any medicine."